

Appendix A. Methods

Search Strategies

Table A-1. PubMed Search Strategy

#	String
1	"diagnosis error"[tiab] OR "diagnosis errors"[tiab] OR "diagnostic error"[tiab] OR "diagnostic errors"[tiab] OR "misdiagnosis"[tiab] OR "misdiagnoses"[tiab] OR "missed diagnosis"[tiab] OR "missed diagnoses"[tiab] OR "wrong diagnosis"[tiab] OR "wrong diagnoses"[tiab] OR "inaccurate diagnosis"[tiab] OR "inaccurate diagnoses"[tiab] OR "delayed diagnosis"[tiab] OR "delayed diagnoses"[tiab] OR "diagnosis delay"[tiab] OR "diagnosis delays"[tiab] OR "diagnostic delay"[tiab] OR "diagnostic delays"[tiab] OR "failure to diagnose"[tiab] OR "diagnostic interval"[tiab] OR "diagnostic intervals"[tiab] OR (Delayed diagnosis[mh]) OR (diagnos*[tiab] AND delay*[tiab])
2	emergency services, hospital[mh] OR emergency treatment[mh] OR emergency department*[tiab] OR emergency service*[tiab] OR emergency physician*[tiab] OR casualty[tiab] OR ambulance*[tiab] OR initial diagnosis[tiab] OR initial contact[tiab] OR warning[tiab] OR urgent care[tiab]) OR emergency room[tiab] OR "accident and emergency"[tiab] OR "accident & emergency"[tiab] OR "Emergency department returns"[tiab] OR "ED returns"[tiab]
3	#1 AND #2
4	Cerebrovascular disorders[mh:noexp] OR Basal ganglia cerebrovascular disease[mh] OR Brain ischemia[mh] OR Carotid artery diseases[mh] OR Intracranial arterial diseases[mh] OR "Intracranial embolism and thrombosis"[mh] OR Intracranial hemorrhages[mh] OR Stroke[mh:noexp] OR Brain infarction[mh] OR Vertebral artery dissection[mh] OR stroke[tiab] OR cerebrovasc*[tiab] OR brain vasc*[tiab] OR cerebral vasc*[tiab] OR CVA[tiab] OR apoplex*[tiab] OR ((brain*[tiab] OR cerebr*[tiab] OR cerebell*[tiab] OR vertebrovasilar[tiab] OR hemispher*[tiab] OR intracran*[tiab] OR intracerebral[tiab] OR infratentorial[tiab] OR supratentorial[tiab] OR MCA[tiab] OR anterior circulation[tiab] OR posterior circulation[tiab] OR basal ganglia[tiab] AND (ischaemi*[tiab] OR ischemi*[tiab] OR infarct*[tiab] OR thrombo*[tiab] OR emboli*[tiab])) OR ((brain*[tiab] OR cerebr*[tiab] OR cerebell*[tiab] OR intracerebral[tiab] OR intracran*[tiab] OR parenchymal[tiab] OR intraventricular[tiab] OR infratentorial[tiab] OR supratentorial[tiab] OR basal gangli*[tiab] AND (haemorrhage*[tiab] OR hemorrhage*[tiab] OR haematoma*[tiab] OR hematoma*[tiab] OR bleed*[tiab])) OR Myocardial infarction[mh] OR myocardial infarct*[tiab] OR heart infarct*[tiab] OR (coronary[tiab] AND syndrome[tiab]) OR heart attack[tiab] OR Thrombosis[mh:noexp] OR Thromboembolism[mh:noexp] OR Venous thromboembolism[mh:noexp] OR Venous thrombosis[mh] OR thrombophylia*[tiab] OR thrombus*[tiab] OR thrombotic*[tiab] OR thrombolic*[tiab] OR thromboemboli*[tiab] OR thrombos*[tiab] OR embol*[tiab] OR Pulmonary embolism[mh] OR PE[tiab] OR DVT[tiab] OR VTE[tiab] OR ((vein*[tiab] OR veno*[tiab] OR vent*[tiab] AND thromb*[tiab]) OR Aortic aneurysm[mh] OR Aneurysm, dissecting[mh:noexp] OR Aneurysm, ruptured[mh] OR ((aort*[tiab] AND (aneurys*[tiab] OR dissect*[tiab] OR ruptur*[tiab] OR tear*[tiab] OR trauma*[tiab] OR split*[tiab])) OR Mesenteric ischemia[mh] OR (ischemi*[tiab] AND mesenteric[tiab]) OR (arterial[tiab] AND thromb*[tiab]) OR Sepsis[mh] OR Septicemia[mh] OR Shock, Septic[mh] OR septicem*[tiab] OR septicaem*[tiab] OR seps*[tiab] OR (seps*[tiab] AND shock*[tiab]) OR Meningitis[mh] OR meningit*[tiab] OR Encephalitis[mh] OR encephalitis[tiab] OR meningoencephalitis[tiab] OR ((brain[tiab] OR cerebral[tiab]) AND (infection*[tiab] OR infectious[tiab] OR inflamm*[tiab] OR swell*[tiab])) OR Epidural Abscess[mh] OR ((spin* OR epidural[tiab]) AND abscess*[tiab]) OR Pneumonia[mh] OR Respiratory tract infections[mh] OR pneumonia*[tiab] OR lung inflammation*[tiab] OR respiratory tract infection*[tiab] OR respiratory infection*[tiab] OR Endocarditis[mh] OR endocarditis[tiab] OR (endocardium AND (inflamm*[tiab] OR infect*[tiab])) OR Appendicitis[mh] OR appendic*[tiab] OR appendicitis acuta[tiab] OR fracture*[tiab] OR "spermatic cord torsion"[mh] OR ("spermatic"[tiab] AND "cord"[tiab] AND "torsion"[tiab]) OR "spermatic cord torsion"[tiab] OR ("testicular"[tiab] AND "torsion"[tiab]) OR "testicular torsion"[tiab] OR "necrotising enterocolitis"[tiab] OR "enterocolitis, necrotizing"[mh] OR ("enterocolitis"[tiab] AND "necrotizing"[tiab]) OR "necrotizing enterocolitis"[tiab] OR ("necrotizing"[tiab] AND "enterocolitis"[tiab]) OR "pregnancy, ectopic"[mh] OR ("pregnancy"[tiab] AND "ectopic"[tiab]) OR "ectopic pregnancy"[tiab] OR ("ectopic"[tiab] AND "pregnancy"[tiab]) OR "pre eclampsia"[mh] OR "pre eclampsia"[tiab] OR "preeclampsia"[tiab] OR "eclampsia"[mh] OR "eclampsia"[tiab] OR "eclampsias"[tiab]
5	#1 AND #4
6	#3 OR #5
7	Animals[mh] NOT humans[mh]
8	#6 not #7
9	Study protocol[ti] OR trial protocol[ti] OR review protocol[ti] OR editorial[pt] OR letter[pt] OR case reports[pt]
10	#8 NOT #9

Table A-2. Embase Search Strategy

#	String
1	"diagnosis error":ti,ab OR "diagnosis errors":ti,ab OR "diagnostic error":ti,ab OR "diagnostic errors":ti,ab OR "misdiagnosis":ti,ab OR "misdiagnoses":ti,ab OR "missed diagnosis":ti,ab OR "missed diagnoses":ti,ab OR "wrong diagnosis":ti,ab OR "wrong diagnoses":ti,ab OR "inaccurate diagnosis":ti,ab OR "inaccurate diagnoses":ti,ab OR "delayed diagnosis":ti,ab OR "delayed diagnoses":ti,ab OR "diagnosis delay":ti,ab OR "diagnosis delays":ti,ab OR "diagnostic delay":ti,ab OR "diagnostic delays":ti,ab OR "failure to diagnose":ti,ab OR "diagnostic interval":ti,ab OR "diagnostic intervals":ti,ab
2	'hospital emergency service'/de OR 'emergency treatment'/de OR "emergency department":ti,ab OR "emergency service":ti,ab OR "emergency physician":ti,ab OR "emergency room":ti,ab OR "accident and emergency":ti,ab OR "accident & emergency":ti,ab OR "Emergency department returns":ti,ab OR "ED returns":ti,ab
3	#1 AND #2
4	'cerebrovascular disease'/de OR 'basal ganglion hemorrhage'/de OR 'brain ischemia'/de OR 'carotid artery disease'/de OR 'cerebral artery disease'/de OR 'thromboembolism'/de OR 'brain hemorrhage'/de OR 'cerebrovascular accident'/de OR 'brain infarction'/de OR 'artery dissection'/de OR stroke:ti,ab OR cerebrovasc*:ti,ab OR "brain vasc":ti,ab OR "cerebral vasc":ti,ab OR CVA:ti,ab OR apoplex*:ti,ab OR ((brain*:ti,ab OR cerebr*:ti,ab OR cerebell*:ti,ab OR vertebrovasilar:ti,ab OR hemispher*:ti,ab OR intracran*:ti,ab OR intracerebral:ti,ab OR infratentorial:ti,ab OR supratentorial:ti,ab OR MCA:ti,ab OR "anterior circulation":ti,ab OR "posterior circulation":ti,ab OR "basal ganglia":ti,ab) AND (ischemi*:ti,ab OR infarct*:ti,ab OR thrombo*:ti,ab OR emboli*:ti,ab)) OR ((brain*:ti,ab OR cerebr*:ti,ab OR cerebell*:ti,ab OR intracerebral:ti,ab OR intracran*:ti,ab OR parenchymal:ti,ab OR intraventricular:ti,ab OR infratentorial:ti,ab OR supratentorial:ti,ab OR "basal gangli":ti,ab) AND (haemorrhage*:ti,ab OR hemorrhage*:ti,ab OR haematoma*:ti,ab OR hematoma*:ti,ab OR bleed*:ti,ab)) OR 'heart infarction'/de OR "myocardial infarct":ti,ab OR "heart infarct":ti,ab OR (coronary:ti,ab AND syndrome:ti,ab) OR heart attack:ti,ab OR 'thrombosis'/de OR 'thromboembolism'/de OR 'venous thromboembolism'/de OR 'vein thrombosis'/de OR 'thromboprophylaxi':ti,ab OR thrombus*:ti,ab OR thrombotic*:ti,ab OR thrombotic*:ti,ab OR thromboemboli*:ti,ab OR thrombos*:ti,ab OR embol*:ti,ab OR 'lung embolism'/de OR PE:ti,ab OR DVT:ti,ab OR VTE:ti,ab OR ((vein*:ti,ab OR veno*:ti,ab OR vent*:ti,ab) AND thromb*:ti,ab) OR 'aortic aneurysm'/de OR 'dissecting aneurysm'/de OR 'aneurysm rupture'/de OR (aort*:ti,ab AND (aneurys*:ti,ab OR dissect*:ti,ab OR ruptur*:ti,ab OR tear*:ti,ab OR trauma*:ti,ab OR split:ti,ab)) OR 'mesenteric ischemia'/de OR (ischemi*:ti,ab AND mesenteric:ti,ab) OR (arterial:ti,ab AND thromb*:ti,ab) OR 'sepsis'/de OR 'septicemia'/de OR 'septic shock'/de OR septicem*:ti,ab OR septicemia*:ti,ab OR seps*:ti,ab OR (sept*:ti,ab AND shock*:ti,ab) OR 'meningitis'/de OR meningit*:ti,ab OR 'encephalitis'/de OR encephalitis:ti,ab OR meningoencephalitis:ti,ab OR ((brain*:ti,ab OR cerebral:ti,ab) AND (infection*:ti,ab OR infectious:ti,ab OR inflamm*:ti,ab OR swell:ti,ab)) OR 'encephalitis'/de OR ((spin* OR epidural:ti,ab) AND abscess*:ti,ab) OR 'pneumonia'/de OR 'respiratory tract infection'/de OR pneumonia*:ti,ab OR "lung inflammation":ti,ab OR "respiratory tract infection":ti,ab OR "respiratory infection":ti,ab) OR 'endocarditis'/de OR endocarditis:ti,ab OR (endocardium:ti,ab AND (inflamm*:ti,ab OR infect*:ti,ab)) OR 'appendicitis'/de OR appendic*:ti,ab OR "appendicitis acuta":ti,ab OR fracture*:ti,ab OR 'testis torsion'/de OR (spermat*:ti,ab AND cord:ti,ab AND torsion:ti,ab) OR "spermat*:ti,ab AND torsion":ti,ab OR (testicular:ti,ab AND torsion:ti,ab) OR "testicular torsion":ti,ab OR "necrotising enterocolitis":ti,ab OR "necrotizing enterocolitis"/de OR (enterocolitis:ti,ab AND necrotising:ti,ab) OR "necrotizing enterocolitis":ti,ab OR (necrotizing:ti,ab AND enterocolitis:ti,ab) OR 'ectopic pregnancy'/de OR (pregnancy:ti,ab AND ectopic:ti,ab) OR "ectopic pregnancy":ti,ab OR 'preeclampsia'/de OR "pre eclampsia":ti,ab OR preeclampsia:ti,ab OR 'eclampsia'/de OR eclampsia:ti,ab OR eclampsias:ti,ab
5	#1 AND #4
6	#3 OR #5
7	'animal'/de NOT 'human'/de
8	#6 not #7
9	"Study protocol":ti OR "trial protocol":ti OR "review protocol":ti OR editorial:it,pt OR letter:it,pt OR "case reports":it,pt OR 'conference paper'/de OR conference:it,pt OR ('review'/de OR 'review' OR 'review'/it)
10	#8 NOT #9
11	#10 AND (2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py OR 2019:py OR 2020:py OR 2021:py)

Table A-3. Cumulative Index to Nursing and Allied Health Literature Search Strategy

#	String
1	(TI "diagnosis errors" OR AB "diagnosis errors") OR (TI "diagnostic error" OR AB "diagnostic error") OR (TI "diagnostic errors" OR AB "diagnostic errors") OR (TI "diagnostic errors" OR AB "diagnostic errors") OR (TI "misdiagnosis" OR AB "misdiagnosis") OR (TI "misdiagnoses" OR AB "misdiagnoses") OR (TI "missed diagnosis" OR AB "missed diagnosis") OR (TI "missed diagnoses" OR AB "missed diagnoses") OR (TI "wrong diagnosis" OR AB "wrong diagnosis") OR (TI "wrong diagnoses" OR AB "wrong diagnoses") OR (TI "inaccurate diagnosis" OR AB "inaccurate diagnosis") OR (TI "inaccurate diagnoses" OR AB "inaccurate diagnoses") OR (TI "delayed diagnosis" OR AB "delayed diagnosis") OR (TI "delayed diagnoses" OR AB "delayed diagnoses") OR (TI "diagnosis delay" OR AB "diagnostic delay") OR (TI "diagnosis delays" OR AB "diagnostic delays") OR (TI "diagnostic delay" OR AB "diagnostic delay") OR (TI "diagnostic delays" OR AB "diagnostic delays") OR (TI "failure to diagnose" OR AB "failure to diagnose") OR (TI "diagnostic interval" OR AB "diagnostic interval") OR (TI "diagnostic intervals" OR AB "diagnostic intervals")
2	(MH "Emergency Service+") OR (MH "Emergency Treatment+") OR (TI "emergency department*" OR AB "emergency department*") OR (TI "emergency service*" OR AB "emergency service*") OR (TI "emergency physician*" OR AB "emergency physician") OR (TI casualty OR AB casualty) OR (TI ambulance* OR AB ambulance*) OR (TI "initial diagnosis" OR AB "initial diagnosis") OR (TI "initial contact" OR AB "initial contact") OR (TI warning OR AB warning) OR (TI "urgent care" OR AB "urgent care") OR (TI "emergency room" OR AB "emergency room") OR (TI "accident and emergency" OR AB "accident and emergency") OR (TI "accident & emergency" OR AB "accident & emergency") OR (TI "Emergency department returns" OR AB "Emergency department returns") OR (TI "ED returns" OR AB "ED returns")
3	S1 AND S2
4	(MM "Cerebrovascular Disorders") OR (MH "Basal Ganglia Cerebrovascular Disease+") OR (MH "Cerebral Ischemia+") OR (MH "Carotid Artery Diseases+") OR (MH "Intracranial Arterial Diseases+") OR (MH "Intracranial Embolism and Thrombosis+") OR (MH "Intracranial Hemorrhage+") OR (MM "Stroke") OR (MH "Hypoxia-Ischemia, Brain+") OR (MM "Vertebral Artery Dissections") OR stroke[tiab] OR (TI cerebrovasc* OR AB cerebrovasc*) OR (TI brain vascul* OR AB brain vascul*) OR (TI cerebral vascul* OR AB cerebral vascul*) OR (TI CVA OR AB CVA) OR (TI apoplex* OR AB apoplex*) OR (TI brain* OR AB brain*) OR (TI cerebr* OR AB cerebr*) OR (TI cerebell* OR AB cerebell*) OR (TI vertebrovasilar OR AB vertebrovasilar) OR (TI hemispher* OR AB hemispher*) OR (TI intracran* OR AB intracran*) OR (TI intracerebral OR AB intracerebral) OR (TI infratentorial OR AB infratentorial) OR (TI supratentorial OR AB supratentorial) OR (TI MCA OR AB MCA) OR (TI anterior circulation OR AB anterior circulation) OR (TI posterior circulation OR AB posterior circulation) OR (TI basal ganglia OR AB basal ganglia) AND (TI ischaemi* OR AB ischaemi*) OR (TI ischemi* OR AB ischemi*) OR (TI infarct* OR AB infarct*) OR (TI thrombo* OR AB thrombo*) OR (TI emboli OR AB emboli) OR (TI brain* OR AB brain*) OR (TI cerebr* OR AB cerebr*) OR (TI cerebell* OR AB cerebell*) OR (TI intracerebral OR AB intracerebral) OR (TI intracran* OR AB intracran*) OR (TI parenchymal OR AB parenchymal) OR (TI intraventricular OR AB intraventricular) OR (TI infratentorial OR AB infratentorial) OR (TI supratentorial OR AB supratentorial) OR (TI basal gangli* OR AB basal gangli*) AND (TI haemorrhage* OR AB haemorrhage*) OR (TI hemorrhage* OR AB hemorrhage*) OR (TI haematoma* OR AB haematoma*) OR (TI hematoma* OR AB hematoma*) OR (TI bleed* OR AB bleed*)) OR (MH "Myocardial Infarction+") OR (TI myocardial infarct* OR AB myocardial infarct*) OR (TI heart infarct* OR AB heart infarct*) OR (TI coronary OR AB coronary) AND (TI syndrome OR AB syndrome) OR (TI heart attack OR AB heart attack) OR (MM "Thrombosis") OR (MM "Thromboembolism") OR (MM "Venous Thromboembolism") OR (MH "Venous Thrombosis+") OR (TI thromboprophyla* OR AB thromboprophyla*) OR (TI thrombus* OR AB thrombus*) OR (TI thrombotic* OR AB thrombotic*) OR (TI thrombolic* OR AB thrombolic*) OR (TI thromboemboli* OR AB thromboemboli*) OR (TI thrombos* OR AB thrombos*) OR (TI embol* OR AB embol*) OR (MM "Pulmonary Embolism") OR (TI PE OR AB PE) OR (TI DVT OR AB DVT) OR (TI VTE OR AB VTE) OR ((TI vein* OR AB vein*) OR (TI veno* OR AB veno*) OR (TI vent* OR AB vent*) AND (TI thromb* OR AB thromb*)) OR (MH "Aortic Aneurysm+") OR (MM "Aneurysm, Dissecting") OR (MM "Heart Rupture") OR ((TI aort* OR AB aort*) AND (TI aneurys* OR AB aneurys*)) OR (TI dissect* OR AB dissect*) OR (TI ruptur* OR AB ruptur*) OR (TI tear* OR AB tear*) OR (TI trauma* OR AB trauma*) OR (TI split* OR AB split*) OR (MH "Mesenteric Ischemia") OR (TI ischemi* OR AB ischemi*) AND (TI mesenteric OR AB mesenteric) OR (TI arterial OR AB arterial) AND (TI thromb* OR AB thromb*) OR (MH "Sepsis+") OR OR (MH "Shock, Septic+") OR (TI septicem* OR AB septicem*) OR (TI septicaem* OR AB septicaem*) OR (TI seps* OR AB seps*) OR (TI sept* OR AB sept*) AND (TI shock* OR AB shock*) OR (MH "Meningitis+") OR (TI meningit* OR AB meningit*) OR (MH "Encephalitis+") OR (TI encephalitis OR AB encephalitis) OR (TI meningoencephalitis OR AB meningoencephalitis) OR ((TI brain OR AB brain) OR (TI cerebral OR AB cerebral) AND (TI infection* OR AB infection*)) OR ((TI infectious OR AB infectious) OR (TI inflamm* OR AB inflamm*) OR (TI swell* OR AB swell*)) OR (MM "Epidural Abscess") OR ((TI spin* OR AB spin*) OR (TI epidural OR AB epidural) AND (TI abscess* OR AB abscess*)) OR (MH "Pneumonia+") OR (MH "Respiratory Tract Infections+") OR (TI pneumonia* OR AB pneumonia*) OR (TI lung inflammation* OR AB lung inflammation*) OR (TI respiratory tract infection* OR AB respiratory tract infection*) OR (TI respiratory infection* OR AB respiratory infection*)

OR (MH "Endocarditis+") OR (TI endocarditis OR AB endocarditis) OR (endocardium AND ((TI inflamm* OR AB inflamm*) OR (TI infect* OR AB infect*))) OR (MM "Appendicitis") OR (TI appendic* OR AB appendic*) OR (TI appendicitis acuta OR AB appendicitis acuta) OR (TI fracture* OR AB fracture*) OR (MM "Spermatic Cord Torsion") OR (TI "spermatic" OR AB "spermatic") AND (TI "cord" OR AB "cord") AND (TI "torsion" OR AB "torsion") OR (TI "spermatic cord torsion" OR AB "spermatic cord torsion") OR (TI "testicular" OR AB "testicular") OR (TI "testicular torsion" OR AB "testicular torsion") OR (TI "necrotising enterocolitis" OR AB "necrotising enterocolitis") OR (MM "Enterocolitis, Necrotizing") OR (TI "enterocolitis" OR AB "enterocolitis") AND (TI "necrotizing" OR AB "necrotizing") OR (TI "necrotizing enterocolitis" OR AB "necrotizing enterocolitis") OR (TI "necrotizing" OR AB "necrotizing") AND (TI "enterocolitis" OR AB "enterocolitis") OR (MM "Pregnancy, Ectopic") OR (TI "pregnancy" OR AB "pregnancy") AND (TI "ectopic" OR AB "ectopic") OR (TI "ectopic pregnancy" OR AB "ectopic pregnancy") OR ((TI "ectopic" OR AB "ectopic" AND (TI "pregnancy" OR AB "pregnancy")) OR (MH "Pre-Eclampsia+") OR (TI "pre eclampsia" OR AB "pre eclampsia") OR (MH "Eclampsia+") OR (TI "eclampsia" OR AB "eclampsia") OR (TI "eclampsias" OR AB "eclampsias")

5 S1 AND S4
6 S3 OR S5
7 (MH "Animals+") NOT (MM "Human")
8 S6 NOT S7
9 TI Study protocol OR TI trial protocol OR TI review protocol OR PT editorial OR PT letter OR PT case reports OR (PT abstract) OR (PT review)
10 S8 NOT S9
11 Filters: from 2000 - 2021

Data Synthesis and Analysis

Key diagnostic accuracy and error terms used in the report are defined in the Methods Section (Data Synthesis and Analysis) as follows:

- false negative rate (1-sensitivity) (denominator is disease present)
- false positive rate (1-specificity) (denominator is disease absent)
- false discovery rate (1-positive predictive value) (denominator is diagnosis label present)
- false omission rate (1-negative predictive value) (denominator is diagnosis label absent)
- total diagnostic error rate (1-accuracy for all patients [disease and non-disease])
- overall cohort-based rates of errors and harms per ED visit (e.g., 2 per 10,000 visits)

Figure A-1 illustrates the formulas used to calculate the false negative rate, the false positive rate, the false discovery rate, and the false omission rate.

Figure A-1. Calculations of false negative rate, false positive rate, false discovery rate, and false omission rate

	Disease Present	Disease Absent
Diagnosis Label Present	TP	FP
Diagnosis Label Absent	FN	TN

$$\text{False negative rate} = \frac{FN}{FN+TP}$$

$$\text{False discovery rate} = \frac{FP}{FP+TP}$$

$$\text{False positive rate} = \frac{FP}{FP+TN}$$

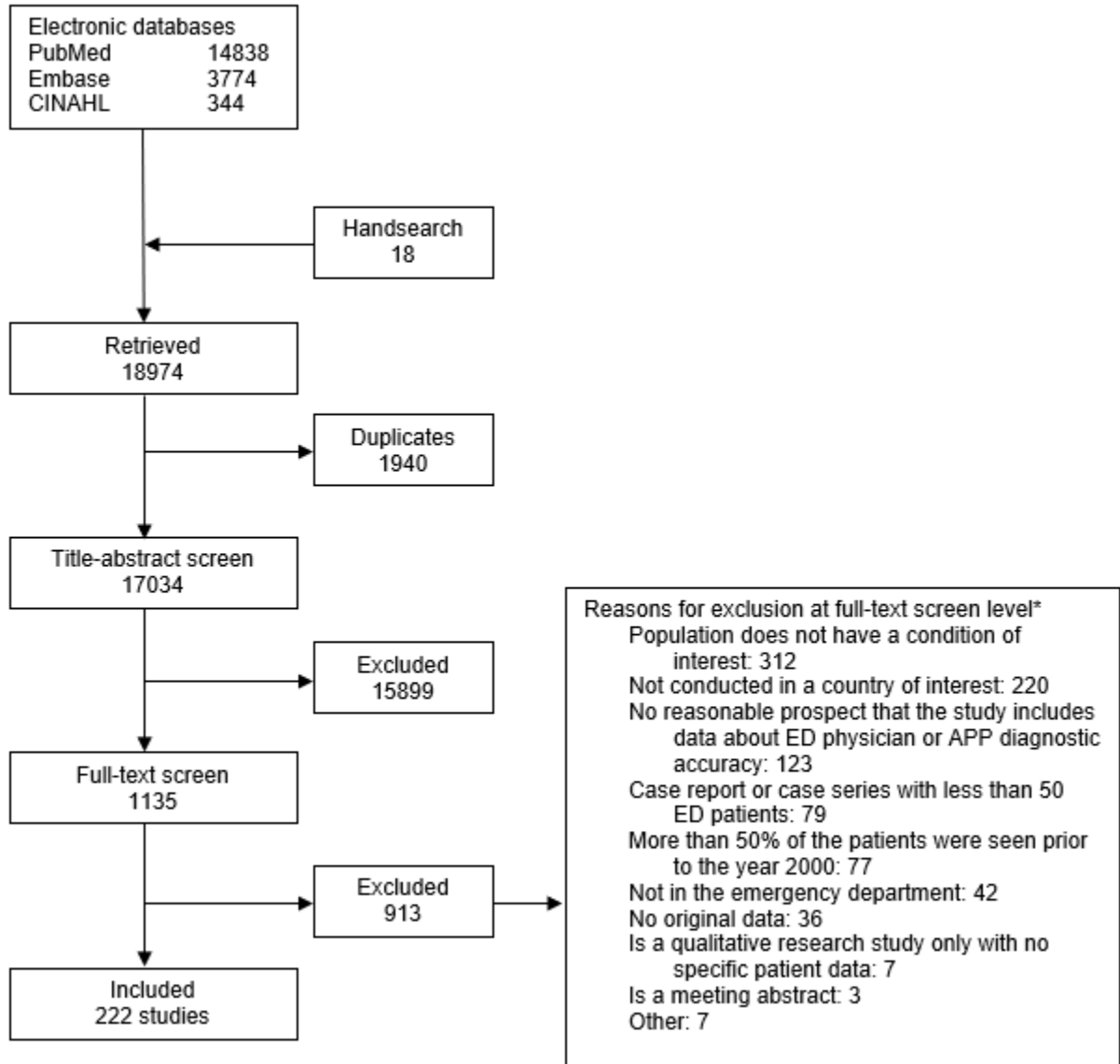
$$\text{False omission rate} = \frac{FN}{FN+TN}$$

$$\text{Total diagnostic error rate} = \frac{FN+FP}{FN+TP+FP+TN}$$

Appendix B. Results

Results of Literature Searches

Figure B-1 show the literature flow for our searches.



APP = advanced practice provider; CINAHL = Cumulative Index to Nursing and Allied Health Literature; ED = emergency department

Results of Grey Literature Searches

Table B-1 displays the results of our review of malpractice claims reports from major medical liability insurance carriers or similar risk management entities.

Table B-1. Summary of the status of malpractice claims reports

Citation	Status
CRICO Strategies. 2011 Annual Benchmarking Report: Malpractice Risks in Emergency Medicine. CRICO Strategies, Cambridge, MA. www.rmstrategies.com	Obtained data relevant to the emergency department from authors and included data in KQ1.
Diagnostic Error in Acute Care. Pennsylvania Patient Safety Advisory. 2010: 7(3).	Excluded because no original data.
The Doctors Company. Emergency Medicine Closed Claims Study. www.thedoctors.com/patientsafety	Excluded because relevant data was not limited to diagnostic errors.
Hanscom R, Small M, Lambrecht A. Diagnostic Accuracy: Room for Improvement. Coverys. www.coverys.com	Excluded because relevant data was not limited to diagnostic errors in the emergency department.
Troxel DB. Diagnostic Error in Medical Practice by Specialty. The Doctor's Advocate. 2014 Sep:2.	Included in KQ1.

Table B-2. Summary of studies reporting on symptom-specific rates of diagnostic error

Author, Year	Symptom	Country/Region	Population	Diagnostic Error Rate	Harm Rate	Serious Harm Rate
Ferree, 2016 ¹	Polytrauma	Western Europe	Adults	12% DDI	4.2% (% of DDI patients that underwent operative intervention for the DDI)	
Snoek, 2013 ²	High-energy trauma	Western Europe	Adults	2.7% DDI		
Muhm, 2012 ³	Polytrauma	Western Europe		23% missed injuries after primary survey, 12% missed after secondary survey, 4% after 24h	0.20%	
Postma, 2012 ⁴	Trauma (flight crash)	Western Europe			12% clinically significant DDI among hospitalized patients (8 of 66 patients)	6% (4 of 66 patients required surgery for the delayed diagnosis)
Montmany, 2008 ⁵	Polytrauma	Western Europe	Adults (16+)	40.3% missed injury	17% clinically significant missed injury	
Willner, 2012 ⁶	Trauma	US	Pediatrics	8% DDI (26 of 324 patients)	0.3% clinically significant DDI (1 patient)	
Kornblith, 2013 ⁷	Found down	US	Adults	16.9%		
Sun, 2007 ⁸	Syncope/near-syncope	US	Adults	4%		
Royl, 2011 ⁹	Dizziness (neurology consulted)	Western Europe		44%	6%: primary diagnosis changed from benign to serious; 5% primary serious diagnosis changed to another serious diagnosis	
Moeller, 2008 ¹⁰	Any neurological complaint (requiring neurology consult)	Canada		17% between emergency physician and final diagnosis, 19% between ED trainee & final diagnosis,		
Dubosh, 2015 ¹¹	Atraumatic headache, Atraumatic back pain	US	Adults			0.5% headache; 0.2% back pain
Miller, 2018 ¹²	Headache	US	Adults + pediatrics	0.17 (10/583)		
Gallagher, 2006 ¹³	Abdominal pain	US	Adults	14.1% (11/78) pts receiving morphine;		

Author, Year	Symptom	Country/Region	Population	Diagnostic Error Rate	Harm Rate	Serious Harm Rate
				14.6% (11/75) pts not receiving morphine		
Osterwalder, 2020 ¹⁴	Abdominal pain	Western Europe	Adults	5.6% (27/480)	1.7% requiring surgery	
Saaristo, 2020 ¹⁵	Abdominal pain	Western Europe	Adults + pediatrics	3% (303 of 10,609 patients returned to ED w/in 48 hours)	0.7% hospitalized; 0.06% had immediate surgery.	
Crosby, 2013 ¹⁶	Minor head trauma, Testicular pain, Abdominal pain	Western Europe	Pediatrics	Head trauma: 0.3% (by surgeon and/or EM provider); Testicular pain: 1.6% surgeon, 0% EM; Abdominal pain: 1% surgeon, 0.3% EM, P-value sig; Combined three conditions 0.9%, surgeon, 0.3% EM		
Freedman, 2017 ¹⁷	Constipation	US	Pediatrics	0.28% (784 of 282,225)		
Ray, 2006 ¹⁸	Dyspnea/acute respiratory failure	Western Europe	Adults (65+)	20% (101/514)		
Pirozzi, 2014 ¹⁹	Dyspnea	Western Europe	Adults	5% with POCUS, 50% w/o POCUS (no difference in clinical outcomes/harms between groups)		
Kline, 2009 ²⁰	Low-risk chest pain	US	Adults		0.5% missed/delayed ACS in control group, 0% in intervention group (received printout on risk assessment)	
Caterino, 2012 ²¹	Infection	US	Adults (65+)	18.4% (19/103) rate of over-diagnosis		
Chung, 2009 ²²	Torso imaging	US		2% (95 of 4768)	0.3% resulted in change in management or recall to ED (16 of 4768)	No serious harm
Filippi, 2008 ²³	Neuro magnetic resonance imaging	US		7.2% (26 of 361)	4.2% (15 of 361)	

ACS = acute coronary syndrome; DDI = delayed diagnosis of injury; ED = emergency department; EM = emergency medicine; POCUS = point-of-care ultrasound; US = United States

Appendix C. List of Excluded Articles

1. Abe T, Tokuda Y, Shiraishi A, et al. In-hospital mortality associated with the misdiagnosis or unidentified site of infection at admission. *Critical care (London, England)*. 2019 Jun 6;23(1):202. doi: 10.1186/s13054-019-2475-9. PMID: 31171006. **Exclusion:** Not conducted in a country of interest
2. Adam N, Sorensen V, Skinner R. Not all intestinal traumatic injuries are the same: a comparison of surgically treated blunt vs. penetrating injuries. *Injury*. 2015 Jan;46(1):115-8. doi: 10.1016/j.injury.2014.07.010. PMID: 25088986. **Exclusion:** Population does not have a condition of interest
3. Adkinson JM, Shafiqat MS, Eid SM, et al. Delayed diagnosis of hand injuries in polytrauma patients. *Annals of plastic surgery*. 2012 Oct;69(4):442-5. doi: 10.1097/SAP.0b013e31824b26e7. PMID: 22868310. **Exclusion:** Population does not have a condition of interest
4. Agarwala A, Puzitiello RN, Leong NL, et al. Primary arthroscopic repair of a traumatic isolated Subscapularis tendon rupture in an adolescent patient. *Orthopedics*. 2020;43(3):E182-E6. doi: 10.3928/01477447-20200129-05. **Exclusion:** Not conducted in a country of interest
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854. Willemssen HW, Bakker FC, Patka P, et al. Traumatic rupture of the thoracic aorta: time to diagnosis and treatment. *European journal of emergency medicine: official journal of the European Society for Emergency Medicine*. 2001 Mar;8(1):39-42. doi: 10.1097/00063110-200103000-00008. PMID: 11314820. **Exclusion:** Population does not have a condition of interest
855. Wilson SP, Vohra T, Knych M, et al. Gonorrhoea and chlamydia in the emergency department: Continued need for more focused treatment for men, women and pregnant women. *The American journal of emergency medicine*. 2017 May;35(5):701-3. doi: 10.1016/j.ajem.2017.01.002. PMID: 28073612. **Exclusion:** Population does not have a condition of interest

856. Winchester DE, Jois P, Kraft SM, et al. Immediate computed tomography coronary angiography versus delayed outpatient stress testing for detecting coronary artery disease in emergency department patients with chest pain. *The international journal of cardiovascular imaging*. 2012 Mar;28(3):667-74. doi: 10.1007/s10554-011-9870-x. PMID: 21503704. **Exclusion:** More than 50% of the patients were seen prior to the year 2000
857. Wittenberg RH, Hargus S, Steffen R, et al. Noncontiguous unstable spine fractures. *Spine*. 2002 Feb 1;27(3):254-7. doi: 10.1097/00007632-200202010-00010. PMID: 11805687. **Exclusion:** Population does not have a condition of interest
858. Wondawek TM, Ali MM. Delay in treatment seeking and associated factors among suspected pulmonary tuberculosis patients in public health facilities of Adama town, eastern Ethiopia. *BMC public health*. 2019;19(1):1527. doi: 10.1186/s12889-019-7886-7. **Exclusion:** Not conducted in a country of interest
859. Wong C, Bødtker S, Buxbom P, et al. A closed-claim analysis of complaints after paediatric antebrachial fractures. *Danish medical journal*. 2017 Dec;64(12). PMID: 29206097. **Exclusion:** Population does not have a condition of interest
860. Wong E, Suat SO. Ectopic pregnancy--a diagnostic challenge in the emergency department. *European journal of emergency medicine : official journal of the European Society for Emergency Medicine*. 2000 Sep;7(3):189-94. doi: 10.1097/00063110-200009000-00005. PMID: 11142270. **Exclusion:** Not conducted in a country of interest
861. Woodfield J, Rane N, Cudlip S, et al. Value of delayed MRI in an angiogram-negative subarachnoid haemorrhage. *Clinical radiology*. 2014 Apr;69(4):350-6. doi: 10.1016/j.crad.2013.11.002. PMID: 24360513. **Exclusion:** No reasonable prospect that the study includes data about ED physician or APP diagnostic accuracy
862. Woodmass JM, Lee J, Johnson NR, et al. Nonoperative Management of Posterior Shoulder Instability: An Assessment of Survival and Predictors for Conversion to Surgery at 1 to 10 Years After Diagnosis. *Arthroscopy - Journal of Arthroscopic and Related Surgery*. 2019;35(7):1964-70. doi: 10.1016/j.arthro.2019.01.056. **Exclusion:** Not conducted in a country of interest
863. Wrotek A, Czajkowska M, Załocka E, et al. Influenza: Underestimated in Children Below 2 Years of Age. *Advances in experimental medicine and biology*. 2018;1108:81-91. doi: 10.1007/5584_2018_240. PMID: 29995212. **Exclusion:** Population does not have a condition of interest
864. Wu CC, Hsu WD, Islam MM, et al. An artificial intelligence approach to early predict non-ST-elevation myocardial infarction patients with chest pain. *Computer methods and programs in biomedicine*. 2019 May;173:109-17. doi: 10.1016/j.cmpb.2019.01.013. PMID: 31046985. **Exclusion:** Not conducted in a country of interest
865. Wu CL, Wang FT, Chiang YC, et al. Unplanned emergency department revisits within 72 hours to a secondary teaching referral hospital in Taiwan. *The Journal of emergency medicine*. 2010 May;38(4):512-7. doi: 10.1016/j.jemermed.2008.03.039. PMID: 18947963. **Exclusion:** Not conducted in a country of interest
866. Wu D, Liu Q, Han SF. Review of traumatic diaphragmatic hernia associated with pelvis fractures. *Chinese journal of traumatology = Zhonghua chuang shang za zhi*. 2006 Apr;9(2):125-8. PMID: 16533441. **Exclusion:** Population does not have a condition of interest
867. Wu HT, Hou ZY, Zhang Q, et al. [Clinical epidemiological analysis of adult spiral tibial shaft fracture associated with ipsilateral posterior malleolar fracture]. *Zhonghua yi xue za zhi*. 2008 Aug 12;88(31):2166-70. PMID: 19080663. **Exclusion:** Population does not have a condition of interest
868. Wu KH, Wu CH, Cheng SY, et al. Analysis of closed malpractice medical claims against Taiwanese EDs: 2003 to 2012. *The American journal of emergency medicine*. 2014 Sep;32(9):990-6. doi: 10.1016/j.ajem.2014.05.033. PMID: 24993687. **Exclusion:** Not conducted in a country of interest
869. Wu KH, Yen YL, Wu CH, et al. Learning from an analysis of closed malpractice litigation involving myocardial infarction. *Journal of forensic and legal medicine*. 2017 May;48:41-5. doi: 10.1016/j.jflm.2017.04.003. PMID: 28441614. **Exclusion:** Not conducted in a country of interest

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871. Wu Y, Dai J, Wang G, et al. Delayed diagnosis and surgical treatment of bronchial foreign body in children. *Journal of pediatric surgery*. 2020;55(9):1860-5. doi: 10.1016/j.jpedsurg.2019.10.052. **Exclusion:** Population does not have a condition of interest
872. Wu Y, Jiang H, Wang B, et al. Fracture of the Lateral Process of the Talus in Children: A Kind of Ankle Injury With Frequently Missed Diagnosis. *Journal of pediatric orthopedics*. 2016 Apr-May;36(3):289-93. doi: 10.1097/bpo.0000000000000437. PMID: 25785595. **Exclusion:** Population does not have a condition of interest
873. Xi Y, Hu DJ, Yao WW, et al. [Classification and imaging diagnosis of Lisfranc joint injuries]. *Zhonghua yi xue za zhi*. 2016 Jul 5;96(25):1976-81. doi: 10.3760/cma.j.issn.0376-2491.2016.25.004. PMID: 27470953. **Exclusion:** Population does not have a condition of interest
874. Xu DM, Xu QM, Ai YH. [Evaluation of organ function monitoring and supporting during the treatment of multiple trauma]. *Hunanyi ke da xue xue bao = Hunanyike daxue xuebao = Bulletin of Hunan Medical University*. 2000 Jun 28;25(3):288-90. PMID: 12212171. **Exclusion:** Not conducted in a country of interest
875. Xu G, He L, Fang X, et al. Management of Renal Artery Occlusion Related to Multiple Trauma in Children: Two Case Reports. *Urology*. 2017;101:154-7. doi: 10.1016/j.urology.2016.08.040. **Exclusion:** No original data
876. Xu MO, Zheng YH, Cao P, et al. [The evaluation of posterior ligament complex injury as well as the analysis of its effects in thoracic-lumbar fractures]. *Zhonghua wai ke za zhi [Chinese journal of surgery]*. 2011 Aug 1;49(8):724-8. PMID: 22168938. **Exclusion:** Population does not have a condition of interest
877. Xu YQ, Li Q, Shen TG, et al. [Early diagnosis and treatment for trauma around the knee with popliteal vascular injury]. *Zhongguo gu shang = China journal of orthopaedics and traumatology*. 2015 Mar;28(3):260-4. PMID: 25936198. **Exclusion:** Population does not have a condition of interest
878. Yadav A, Sikdar J, Anand V, et al. Quantitative measurement of intra-compartmental pressure of the leg in a acute traumatic injury: As a routine trend. *Journal of clinical orthopaedics and trauma*. 2015 Dec;6(4):230-5. doi: 10.1016/j.jcot.2015.05.003. PMID: 26566335. **Exclusion:** Not conducted in a country of interest
879. Yaghmai V, Kuppaswami S, Berlin JW, et al. Evaluation of personal digital assistants as an interpretation medium for computed tomography of patients with intracranial injury. *Emergency radiology*. 2003 Oct;10(2):87-9. doi: 10.1007/s10140-003-0300-9. PMID: 15290513. **Exclusion:** Case report or case series with less than 50 ED patients
880. Yajima T, Jingu D, Ubukata S, et al. [TUBERCULOSIS DIAGNOSIS FOLLOWING A VISIT TO THE EMERGENCY ROOM]. *Kekkaku: [Tuberculosis]*. 2016 May;91(5):503-7. PMID: 28661591. **Exclusion:** Not conducted in a country of interest
881. Yamada S, Yasui K, Kawakami Y, et al. DEFENSIVE Stroke Scale: Novel Diagnostic Tool for Predicting Posterior Circulation Infarction in the Emergency Department. *Journal of stroke and cerebrovascular diseases: the official journal of National Stroke Association*. 2019 Jun;28(6):1561-70. doi: 10.1016/j.jstrokecerebrovasdis.2019.03.005. PMID: 30930243. **Exclusion:** Not conducted in a country of interest
882. Yang CM, Tsai SH, Chiu WT. How risky is caring for emergency patients at risk of malpractice litigation: a population based epidemiological study of Taiwan's experiences. *BMC health services research*. 2009 Sep 17;9:168. doi: 10.1186/1472-6963-9-168. PMID: 19761596. **Exclusion:** Not conducted in a country of interest
883. Yang H, Cao X, Sun S, et al. Demands and countermeasures for outpatients and emergency patients during the outbreak of coronavirus disease 2019 in large general hospital. *Zhongnan da xue xue bao Yi xue ban = Journal of Central South University Medical sciences*. 2020 May 28;45(5):507-12. doi: 10.11817/j.issn.1672-7347.2020.200325. PMID: 32879098. **Exclusion:** Not conducted in a country of interest

884. Yang SY, Xu H. [Testicular torsion with a typical symptoms: seven cases report and review of the literature]. *Zhonghua nan ke xue = National journal of andrology*. 2010 Aug;16(8):732-4. PMID: 21090351. **Exclusion:** Case report or case series with less than 50 ED patients
885. Yang Y, Zhang L, Wang X, et al. Echocardiographic diagnosis of rare pathological patterns of sinus of Valsalva aneurysm. *PloS one*. 2017;12(3). doi: 10.1371/journal.pone.0173122. **Exclusion:** More than 50% of the patients were seen prior to the year 2000
886. Yang Y, Zhang W, Peng M, et al. Acute fatal chest pain: optimized procedure in emergency department. *BMC emergency medicine*. 2013;13 Suppl 1 (Suppl 1):S4. doi: 10.1186/1471-227x-13-s1-s4. PMID: 23902535. **Exclusion:** Not conducted in a country of interest
887. Yaniv G, Mozes O, Greenberg G, et al. Common sites and etiologies of residents' misinterpretation of head CT scans in the emergency department of a level I trauma center. *The Israel Medical Association journal: IMAJ*. 2013 May;15(5):221-5. PMID: 23841241. **Exclusion:** Not conducted in a country of interest
888. Yee AM, Mazumder PK, Dong F, et al. Impact of Healthcare Access Disparities on Initial Diagnosis of Breast Cancer in the Emergency Department. *Cureus*. 2020 Aug 25;12(8):e10027. doi: 10.7759/cureus.10027. PMID: 32864279. **Exclusion:** Population does not have a condition of interest
889. Yeh DD, Cropano C, Fagenholz P, et al. Gangrenous cholecystitis: Deceiving ultrasounds, significant delay in surgical consult, and increased postoperative morbidity! *The journal of trauma and acute care surgery*. 2015 Nov;79(5):812-6. doi: 10.1097/ta.0000000000000832. PMID: 26496106. **Exclusion:** Not conducted in a country of interest
890. Yeika EV, Tchoumi Tanchou JC, Foryoung JB, et al. Tropical diabetic hand syndrome: a case report. *BMC research notes*. 2017;10(1):94. doi: 10.1186/s13104-017-2405-3. **Exclusion:** No original data
891. Yildiz M, Akgun Y, Ozer H, et al. A rare case presentation: Pregnancy and gastric carcinoma. *BMC gastroenterology*. 2020;20(1). doi: 10.1186/s12876-020-1184-9. **Exclusion:** Not in the emergency department
892. Yip H, Crock C, Chan E. Diagnostic error in an ophthalmic emergency department. *Diagnosis (Berlin, Germany)*. 2020 May 26;7(2):129-31. doi: 10.1515/dx-2019-0047. PMID: 31671070. **Exclusion:** Case report or case series with less than 50 ED patients
893. Yock-Corrales A, Mackay MT, Mosley I, et al. Acute childhood arterial ischemic and hemorrhagic stroke in the emergency department. *Annals of emergency medicine*. 2011 Aug;58(2):156-63. doi: 10.1016/j.annemergmed.2010.10.013. PMID: 21310508. **Exclusion:** No reasonable prospect that the study includes data about ED physician or APP diagnostic accuracy
894. Yong JH, Schuh S, Rashidi R, et al. A cost effectiveness analysis of omitting radiography in diagnosis of acute bronchiolitis. *Pediatric pulmonology*. 2009 Feb;44(2):122-7. doi: 10.1002/ppul.20948. PMID: 19142890. **Exclusion:** Population does not have a condition of interest
895. Yoo SM, Rho JY, Lee HY, et al. Current Concepts in Cardiac CT Angiography for Patients With Acute Chest Pain. *Korean circulation journal*. 2010 Nov;40(11):543-9. doi: 10.4070/kcj.2010.40.11.543. PMID: 21217929. **Exclusion:** Not conducted in a country of interest
896. Young KW, Park YU, Kim JS, et al. Misdiagnosis of Talar Body or Neck Fractures as Ankle Sprains in Low Energy Traumas. *Clinics in orthopedic surgery*. 2016 Sep;8(3):303-9. doi: 10.4055/cios.2016.8.3.303. PMID: 27583114. **Exclusion:** Population does not have a condition of interest
897. Yu DW, Jung YJ, Choi BY, et al. Subarachnoid hemorrhage with negative baseline digital subtraction angiography: is repeat digital subtraction angiography necessary? *Journal of cerebrovascular and endovascular neurosurgery*. 2012 Sep;14(3):210-5. doi: 10.7461/jcen.2012.14.3.210. PMID: 23210049. **Exclusion:** Not conducted in a country of interest
898. Yu RF, San Jose MC, Manzanilla BM, et al. Sources and reasons for delays in the care of acute stroke patients. *Journal of the neurological sciences*. 2002 Jul 15;199(1-2):49-54. doi: 10.1016/s0022-510x(02)00103-x. PMID: 12084442. **Exclusion:** Not conducted in a country of interest

899. Zahavi A, Luckman J, Yassar I, et al. Severe cranial neuropathies caused by falls from heights in children. *Graefes's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie*. 2016 Apr;254(4):765-72. doi: 10.1007/s00417-015-3199-4. PMID: 26553199. **Exclusion:** Population does not have a condition of interest
900. Zhan S, Hong S, Shan-Shan L, et al. Misdiagnosis of aortic dissection: experience of 361 patients. *Journal of clinical hypertension (Greenwich, Conn)*. 2012 Apr;14(4):256-60. doi: 10.1111/j.1751-7176.2012.00590.x. PMID: 22458748. **Exclusion:** Not conducted in a country of interest
901. Zhang HL, Lin LR, Liu GL, et al. Clinical spectrum of neurosyphilis among HIV-negative patients in the modern era. *Dermatology (Basel, Switzerland)*. 2013;226(2):148-56. doi: 10.1159/000347109. PMID: 23615173. **Exclusion:** Not conducted in a country of interest
902. Zhang J, Hu X, Hu X, et al. Clinical features, Outcomes and Molecular Profiles of Drug Resistance in Tuberculous Meningitis in non-HIV Patients. *Scientific reports*. 2016 Jan 7;6:19072. doi: 10.1038/srep19072. PMID: 26738994. **Exclusion:** Not conducted in a country of interest
903. Zhang XY, Di DM, Jiang NQ, et al. Emergent treatment of patients with traumatic aorta ruptures. *Chinese journal of traumatology = Zhonghua chuang shang za zhi*. 2007 Jun;10(3):163-5. PMID: 17535640. **Exclusion:** Not conducted in a country of interest
904. Zhou L, Grushko M, Taurus JM, et al. Initial misdiagnosis of acute flail mitral valve is not infrequent: The role of echocardiography. *Journal of cardiovascular disease research*. 2013 Jun;4(2):123-6. doi: 10.1016/j.jcdr.2013.05.004. PMID: 24027369. **Exclusion:** Population does not have a condition of interest
905. Zhu D, Su Z, Ye S, et al. [Clinical misdiagnosis analysis of valproate encephalopathy]. *Zhonghua yi xue za zhi*. 2014 Sep 9;94(33):2610-2. PMID: 25511495. **Exclusion:** Not conducted in a country of interest
906. Zhu DS, Fu J, Zhang Y, et al. Neurological antiphospholipid syndrome: Clinical, neuroimaging, and pathological characteristics. *Journal of the neurological sciences*. 2014 Nov 15;346(1-2):138-44. doi: 10.1016/j.jns.2014.08.010. PMID: 25173939. **Exclusion:** Not conducted in a country of interest
907. Zingg T, Agri F, Bourgeat M, et al. Avoiding delayed diagnosis of significant blunt bowel and mesenteric injuries: Can a scoring tool make the difference? A 7-year retrospective cohort study. *Injury*. 2018 Jan;49(1):33-41. doi: 10.1016/j.injury.2017.09.004. PMID: 28899564. **Exclusion:** Population does not have a condition of interest

Appendix D. Evidence Tables

Table D-1. Characteristics of studies that evaluated diagnostic errors in the emergency department

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Moy, 2015 ²⁴	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 797 Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Multiple settings	Study design: Cross-sectional Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator Named data source: Healthcare Cost and Utilization Project State Inpatient Databases and State Emergency Department Databases Dates: 2007 to 2007	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: patients with an index admission of acute myocardial infarction Total N: 111973 Age: NR Male, n (%): 67256 (60%) Race, n (%): White, 86038 (77%) Black/African American, 9275 (8%)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: APSF/Graber 2005 Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Leeuwenburgh, 2014 ²⁵	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 6 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2010 to 2010	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 230 Age: Mean, 35 Range, 24 to 49 Male, n (%): 92 (40%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled:	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Peng, 2015 ²⁶	Patient type: General ED Patient age: Unclear	Country: Western Europe	Study design: Prospective cohort Comparison group: None	Disease specificity: Multiple Diseases Diseases studied: OTHER	Care delivered entirely within ED: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Look back or look forward analysis: Data source: Prospective data collection Numerator: Numerator only (error/harm) Named data source: Dates: 2007 to 2009	MULTIPLE Other inclusion criteria: None: Total N: Age: Male, n (%): Race, n (%):	Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	definition: None Harms severity: None Causal taxonomy used: None
Dubosh, 2015 ¹¹	Patient type: General ED Patient age: Adults only Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Multiple	Country: US Region, if US: Other Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator Named data source: State Emergency Department Databases and State Inpatient Databases Dates: 2006 to 2012	Disease specificity: Multiple diseases Diseases studied: Other Other inclusion criteria: Multiple: We excluded patients with trauma, those who left the hospital against medical advice, those who were transferred to another acute care facility, those who died at the index ED visit, and out-of-state residents. Total N: 2,101,081 Age: Mean, 57 Median, 57 Male, n (%): 1008519 (48) Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: ED revisit with serious neurological condition or in-hospital death within 30 days of treat-and-release ED visit for non-specific headache or back pain Harms severity: Unclear or NR Causal taxonomy used: None
March, 2014 ²⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Other: The time to operation >48 hours Total N: 81 Age: NR Male, n (%): 29 (36%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR		health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2009 to 2013		involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Wilson, 2014 ²⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 4576 Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: All US Urban/rural: Multiple settings	Study design: Cross- sectional Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Inpatient and Outpatient Standard Analytic Files Dates: 2004 to 2005	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: diagnosed with acute myocardial infarction who presented to the emergency department for initial care; included patients who were admitted to the hospital, discharged to home or a skilled nursing facility, or transferred to another facility for further care Total N: 371638 Age: Median, 80 Male, n (%): 177650 (48) Race, n (%): White, 326129 (88) Black/African American, 29292 (8)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: missed acute myocardial infarction diagnosis (emergency department discharge home with a condition suggestive of cardiac ischemia with subsequent hospital admission within 7 days with acute myocardial infarction. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Graff, 2014 ²⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 2 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: NA Dates: 1997 to 2007	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: None: Total N: 295758 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was	Conceptual diagnostic error definition: ACS cases with 1) ED evaluation within the previous 21 days not resulting in admission; 2) chief complaint for the first ED visit consistent with ACS, that is, either chest pain or chest pain equivalent (shortness of breath, palpitation, syncope, unexpla Conceptual harms definition: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					handled: Unclear or NR	Harms severity: None Causal taxonomy used: None
Faiz, 2014 ³⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban/rural: Multiple settings	Study design: Cross-sectional Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Unclear or NR Named data source: NA Dates: 2009 to 2010	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Excluded patients with intracerebral hemorrhage, TIA, in-hospital strokes, and stroke mimics. Total N: 290 Age: Median, 75 Male, n (%): 153 (52.8) Race, n (%): NR	Care delivered entirely within ED: Stroke unit Consultants involved: Neurologists Non-physicians involved: Nurse Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Time from admission to being evaluated by a nurse, to being examined by a doctor, to initiation of computed tomography scan Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: UK Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Case series Comparison group: Unclear or NR Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2010 to 2011	Disease specificity: Multiple Diseases Diseases studied: Unclear or NR Other inclusion criteria: : Surgical cases, elective day cases with known diagnoses and cases where an initial or discharge diagnosis was not recorded were excluded from the study. Surgical cases were excluded, as in the UK healthcare system, these cases are often referred directly to a surgical center by the primary care physician. Total N: 703 Age: NR Male, n (%): Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Included physicians with other training (specify) Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: APSF/Graber 2005 Conceptual harms definition: Unclear or NR Harms severity: Unclear or NR Causal taxonomy used: Unclear or NR
Palomeras Soler, 2015 ³²	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status:	Country: Western Europe Region, if applicable (non-US): US: Not applicable	Study design: Cross-sectional Comparison group: None Look back or look forward analysis:	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Unclear or NR:	Care delivered entirely within ED: Unclear or NR Consultants involved: Neurologists	Conceptual diagnostic error definition: Delay between arrival at the Emergency Service and the neurologist's

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	applicable (non-US) Urban/rural: Urban / metropolitan	Data source: Unclear or NR Numerator: Numerator and denominator Named data source: NA Dates: 2007 to 2012	Total N: 411 Age: Mean, 71.5 Male, n (%): 231 (56%) Race, n (%): NR	Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	assessment was less than 24 hours in 82% of cases and less than 48 hours in 93.9% Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Pirozzi, 2014 ¹⁹	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable Urban/rural: Urban / metropolitan	Study design: Randomized controlled trial Comparison group: Concurrent control Look back or look forward analysis: Both Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2012	Disease specificity: Multiple Diseases Diseases studied: Other Other inclusion criteria: Multiple: We included 180 patients admitted to the ED (after pre-hospital care for some of them) because of complaining dyspnea, defined as either the sudden onset of shortness of breath without history of chronic symptoms or as increase in the severity of the chronic shortness of breath. Exclusion criteria were age Total N: 168 Age: Mean, 74 Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Newman-Toker, 2014 ³³	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 1016 Annual ED volume:	Country: US Region, if US: All US Urban/rural: Multiple settings	Study design: Cross-sectional Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Stroke admissions via the emergency department Total N: 26052 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR	Conceptual diagnostic error definition: APSF/Graber 2005 Conceptual harms definition: Hospitalization for stroke Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Ownership: Multiple		Named data source: Healthcare Cost and Utilization Project Dates: 2008 to 2009		Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	
Cheong, 2014 ³⁴	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban/rural Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm) Named data source: Discharge Abstract Database (DAD) Dates: 2004 to 2010	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 41,405 Age: Range, 0-17 Male, n (%): 24429 (59) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Vioque, 2014 ³⁵	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Registry Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Pennsylvania Trauma Outcomes Study, Dates: 2002 to 2010	Disease specificity: Not restricted by diseases Diseases studied: Other Other inclusion criteria: None: Total N: 106 Age: Mean, 23.2 Male, n (%): 81 (76.4) Race, n (%): NR	Care delivered entirely within ED: Other location (specify) Consultants involved: trauma surgery, anesthesia, Non-physicians involved: nurse, paramedic, respiratory technician Non-EM physicians involved: trauma surgery, radiology, anesthesia Trainees involved: Included trainees How left without treatment was	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: (Trauma PI Conference) Mackenzie et al Harms severity: Injury severity scale ISS and Trauma Score- Injury Severity Score TRISS Causal taxonomy used: Joint Commission (5 interacting root nodes: impact, type, domain, cause, and prevention)

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					handled: Unclear or NR	
Grosmaître, 2013 ³⁶	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single health system, multiple EDs Number of EDs involved: 4 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2004 to 2008	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Admitted with a main diagnosis of STEMI Total N: 255 Age: Mean, 84.6 Male, n (%): 95 (27.3) Race, n (%): NR	Care delivered entirely within ED: cardiology department Consultants involved: Unclear or NR Non-physicians involved: triage nurse Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: waiting time (time from registration at reception desk to the time of first medical contact) and time for diagnosis and decision making (time between the first medical observation and that of the note in which therapeutic strategy chosen was described for Conceptual harms definition: 1-month mortality Harms severity: None Causal taxonomy used: None
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2008 to 2010	Disease specificity: Multiple Diseases Diseases studied: Other Other inclusion criteria: None: Patients who developed constipation during their hospitalization were excluded. Total N: 3685 Age: Mean, 6.6 Male, n (%): 1842 (50) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: Misdiagnosis was defined as an alternative diagnosis assigned within 7 days, meeting all the following criteria: (1) resulted in hospitalization or outpatient procedure; (2) required a surgical or radiologic intervention (eg, air enema, bone marrow Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Torres-Macho, 2013 ³⁸	Patient type: General ED Patient age: Unclear or NR Teaching status:	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis:	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Other:	Care delivered entirely within ED: hospital Ward Consultants involved: radiologists	Conceptual diagnostic error definition: Delayed diagnosis (pulmonary embolism was diagnosed by chest CT that was

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Academic/Teaching Hospital setting: Single health system, multiple EDs involved: 3 Annual ED volume: Unclear or NR Ownership: Unclear or NR	applicable (non-US) Urban/rural: Urban / metropolitan	analysis: Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2008 to 2011	Patients admitted to hospital with a diagnosis of acute symptomatic pulmonary embolism confirmed by chest computed tomography Total N: 436 Age: Mean, 67.4 Male, n (%): 212 (48.6) Race, n (%): NR	Non-physicians involved: Unclear or NR Non-EM physicians involved: radiologist Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	ordered while the patient was still at the emergency department vs. pulmonary embolism that was diagnosed by chest CT ordered during hospitalization after the patient had left the ED Conceptual harms definition: Mortality during hospitalization Harms severity: None Causal taxonomy used: None
Naiditch, 2013 ³⁹	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2007 to 2010	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 816 Age: NR Male, n (%): 476 (58%) Race, n (%): White, 186 (23%) Black/African American, 55 (7%)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Kornblith, 2013 ⁷	Patient type: General ED Patient age: Adults only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume:	Country: US Region, if US: West Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Disease specificity: Multiple Diseases Diseases studied: Other Other inclusion criteria: Other: patients younger than 18 years and incarcerated patients were excluded Total N: 201 Age: Mean, 53.8 Male, n (%): 138 (68.7) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: triage nurse Non-EM physicians involved: Emergency medicine trained	Conceptual diagnostic error definition: None Conceptual harms definition: Delayed diagnosis Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	40,000 to 59,999 Ownership: Unclear or NR		Named data source: Dates: 2007 to 2011		physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Russell, 2013 ⁴⁰	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Other Urban/rural: Urban / metropolitan	Study design: Ambidirectional cohort study Comparison group: Pre/post comparison Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator only (error/harm) Named data source: Dates: 2008 to 2011	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 166 Age: Mean, 10.2 Male, n (%): 104 (63%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Surgeon Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Sarraj, 2015 ⁴¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: South Urban/rural: Urban / metropolitan	Study design: Cross-sectional Comparison group: None Look back or look forward analysis: Data source: Electronic health record data Numerator: Unclear or NR Named data source: UT Houston Stroke Registry database Dates: 2008 to 2010	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: AIS patients who were treated with IV t-PA within 4.5 hour window. Excluded patients who had ischemic infarctions evident in both anterior and posterior circulation territories, patients without evidence of new infarct on MRI diffusion-weighted images or follow-up CT imaging, or patients with incomplete time data. Total N: 252 Age: Mean, 67, 65	Care delivered entirely within ED: Unclear or NR Consultants involved: Vascular neurologist Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Time from door to doctor, to evaluation by neurologist, to computed tomography scan, to needle Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
				Male, n (%): 113 (44.8) Race, n (%): NR		
Mohamed, 2013 ⁴²	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Young Stroke registry Dates: Unclear or NR to Unclear or NR	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Symptom (e.g., dizziness): Patients who presented to an ED after onset of acute neurologic symptoms. Excluded patients with ongoing substance abuse and those without a permanent address. Total N: 93 Age: Mean, 38.1 Male, n (%): 39 (41.9) Race, n (%): White, 50 (53.8) Black/African American, 41 (44.1)	Care delivered entirely within ED: Unclear or NR Consultants involved: Neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: 'whether the patient's diagnosis was initially missed at the presenting hospital. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Guillan, 2012 ⁴³	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2004 to 2011	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients treated with IV-tPA Total N: 606 Age: Mean, 72 Male, n (%): 292 (48.2) Race, n (%): NR	Care delivered entirely within ED: Stroke unit Consultants involved: Neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: neurologists Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Diagnosis of a stroke mimic was established when clinical or paraclinical (i.e., radiological) evidence of an alternative diagnosis to stroke was ascertained. Conceptual harms definition: Complications of IV-tPA Harms severity: None Causal taxonomy used: None
Caterino, 2012 ²¹	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting:	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Unsure Data source: Electronic health record data	Disease specificity: Multiple diseases Diseases studied: MULTI-INFECTION Other inclusion criteria: None: incarcerated, non-English speaking, seen within prior 7	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: Graber 2005

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Private, not for profit		Numerator: Numerator and denominator Named data source: Dates: 2006 to 2009	days for same condition, previously enrolled in the study, evaluated by the trauma team, lacked ability to give consent when no proxy was available Total N: 103 Age: Range, 55 subjects 65-74, 34 subsubjects 75-84, 14 subjects >= 85 Male, n (%): 49 (47.6) Race, n (%): White, 83 (80)	involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Fully-trained emergency clinicians only How left without treatment was handled: Unclear or NR	
Lever, 2013 ⁴⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2008 to 2009	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients in whom stroke was diagnosed with MRI within first 24-48 hours of admission; also included patients with atypical symptoms who progressed to typical symptoms. Excluded with TIA or hemorrhagic stroke or in-hospital strokes, patients who were transferred, or diagnosed with stroke prior to ED arrival Total N: 189 Age: Mean, 70.4 Median, 73 Range, 20 to 99 Male, n (%): 95 (50.3) Race, n (%): White, 117 (61.9) Black/African American, 51 (27.0)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed ischemic stroke Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Snoek, 2013 ²	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting:	Country: Western Europe Region, if US: Not applicable (non-US)	Study design: Prospective cohort Comparison group: Other (specify) Look back or look forward analysis: Look forward method	Disease specificity: Single disease Diseases studied: OTHER MULTIPLE Other inclusion criteria: Other: Excluded the patients who were not admitted for observation and	Care delivered entirely within ED: ED only Consultants involved: Trauma surgery (attending), "surgery resident	Conceptual diagnostic error definition: None Conceptual harms definition: Injury not diagnosed by 1st and 2nd trauma survey Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Urban/rural: Urban / metropolitan	(symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2009 to 2010	who could not be examined at tertiary trauma survey Total N: 13 (delayed diagnosis patients) Age: Mean, 48 Male, n (%): 10 (77) Race, n (%): NR	"Neurology, pediatrics, anesthesiology (provider and assistant), radiology(resident and assistants), surgery resident Non-physicians involved: ED Nurses Non-EM physicians involved: Neurology, pediatrics, anesthesiology, radiology, trauma surgeon, surgical resident Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Crosby, 2013 ¹⁶	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Seen by surgeon or seen by ED physician Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2005 to 2008	Disease specificity: Multiple diseases Diseases studied: Other Other inclusion criteria: Multiple: Exclusion criteria include patients who left without being seen, patients seen by pediatricians for surgical complaints prior to systems changes, polytrauma, major head injury, isolated spine injury, patients sent from triage directly to an ambulatory clinic for low-acuity complaints, incomplete data on chart review and inappropriate coding Total N: 2415 Age: Range, 1 month -18 year Male, n (%): 1311 (54) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Surgeons Non-physicians involved: Included other ED clinicians (specify) Non-EM physicians involved: Surgeon Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: None Conceptual harms definition: misdiagnosis /return ED visit w/in 72 hours for same condition Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Muhm, 2012 ³	Patient type: General ED Patient age: Both adults and children Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban/rural Unclear or NR	Study design: Retrospective cohort Comparison group: group A consisted of patients without delays in diagnosis, and group B with delays in diagnosis Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2008 to 2009	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 111 Age: Mean, 43 Range, 11-85 Male, n (%): 80 (72) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Radiologists Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: 'diagnostic efficacy' page 8 Conceptual harms definition: None Harms severity: Hoyt et al., missed diagnosis categorized 'missed' diagnosis as 'justified/acceptable' or 'unjustified' Causal taxonomy used: None
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Unclear or NR	Country: US Region, if US: West Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Data source: Prospective data collection Numerator: Numerator only (error/harm) Named data source: Dates: 2008 to 2009	Disease specificity: Not restricted by disease Diseases studied: Other Other inclusion criteria: Symptom (e.g., dizziness): Initial Glasgow Coma Scale (GCS) score of #14 Total N: 112 Age: Mean, 52.4 Male, n (%): 77 (69) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Scheuermeyer, 2012 ⁴⁶	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting:	Country: Canada Region, if US: Not applicable (non-US) Urban/rural:	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Symptom (e.g., dizziness): patients with chest pain and no clear	Care delivered entirely within ED: also Cardiology referral Consultants involved: cardiologist Non-physicians	Conceptual diagnostic error definition: a patient who was discharged from the ED with a non-acute coronary syndrome diagnosis, without specific follow-up, who

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Unclear or NR	Urban / metropolitan	denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: 2006 to 2006	noncardiac cause Total N: 1116 Age: Mean, 54.7 Male, n (%): 668 (60) Race, n (%): NR	involved: triage nurse Non-EM physicians involved: cardiologists Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	subsequently proved to have an acute coronary syndrome diagnosis or an adverse event within 30 days Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Hochberg, 2011 ⁴⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Randomized controlled trial Comparison group: Concurrent control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator and denominator Named data source: NA Dates: 2007 to 2009	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Process (e.g., left without treatment): Included all head CTA examinations ordered after hours by emergency department physicians; excluded if resident indicated that the preliminary interpretation was aided by the "back-up" neuroradiology attending physician or fellow on call Total N: 83 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: radiology resident Non-physicians involved: Unclear or NR Non-EM physicians involved: radiology resident Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Agreement between resident preliminary CTA interpretation and final DSA results Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Martin, 2011 ⁴⁸	Patient type: Multiple EDs Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single health system, multiple EDs Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator and denominator Named data source: Swiss Neuropediatric	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Diagnosed with acute ischemic stroke Total N: 91 Age: Median, 5.3 Male, n (%): 61 (67) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without	Conceptual diagnostic error definition: Delay in diagnosis > 6 hours Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Unclear or NR		Stroke Registry Dates: 2000 to 2006		treatment was handled: Unclear or NR	
Postma, 2012 ⁴	Patient type: General ED Patient age: Both adults and children Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 13 Annual ED volume: Multiple Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Hospitalized with DDI vs Hospitalized without DDI Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator Named data source: Dates: 2009 to 2009	Disease specificity: Multiple diseases Diseases studied: Other Other inclusion criteria: Unclear or NR: inclusion: patients admitted from the ED after airplane crash Total N: Age: Mean, 38 Range, 11 months to 76 years Male, n (%): (66) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: Clinically significant injury: 'an injury if unnoticed, would possibly lead to a delayed or poor healing, and could have consequences for a patient's recovery and daily activities. This definition is not based on severity as a treat to life, but more as Harms severity: Clinically significant injury: 'an injury if unnoticed, would possibly lead to a delayed or poor healing, and could have consequences for a patient's recovery and daily activities. This definition is not based on severity as a treat to life, but more as Causal taxonomy used: None
Royle, 2011 ⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume:	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Disease specificity: Not restricted by diseases Diseases studied: Other Other inclusion criteria: None: Total N: 475 Age: Median, 53 Male, n (%): 190 (40) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Neurologists only Non-physicians involved: Included other ED clinicians (specify) Non-EM physicians involved: Included physicians with other	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Ownership: Public		Named data source: Dates: 2005 to 2006		training (specify) Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Harris, 2011 ⁴⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 24 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Multiple Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm) Named data source: International Registry of Acute Aortic Dissection Dates: 1996 to 2007	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: acute onset type A IV-tPA Total N: 894 Age: Median, 62 Male, n (%): 600 (67.1) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: time from the initial emergency department presentation to diagnosis Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Smith, 2012 ⁵⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2002 to 2005	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Symptom (e.g., dizziness): Included patients with symptoms compatible with acute pulmonary embolism (i.e., chest pain, dyspnea, hypoxia, pre-syncope, or syncope), diagnosis was made with computed tomography at institution; excluded asymptomatic patients and patients diagnosed before arrival Total N: 400 Age: Median, 68	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Early diagnosis was defined as having the confirmatory CT < 12 hours from ED arrival and delayed diagnosis was defined as a CT > 12 hours from arrival Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
				Male, n (%): 195 (48.8) Race, n (%): NR		
Miedema, 2011 ⁵¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 31 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Multiple settings	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2003 to 2009	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: STEMI or new left bundle-branch block in patients with chest pain of 24 hours' duration Total N: 2015 Age: Mean, Delay < 120 mins 61.3 Delay >120 mins 64.0 Male, n (%): (Delay < 120 mins 73.9 Delay >120 mins 70.6) Race, n (%):	Care delivered entirely within ED: PCI center at referral hospital Consultants involved: cardiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Delays resulting from non-diagnostic ECG, diagnostic dilemma, or emergency department delay: "A delay resulting from nondiagnostic ECG was documented if the patient's initial ECG was nondiagnostic, with a subsequent ECG revealing a STEMI. A delay resulting from Conceptual harms definition: In-hospital, 30-day, and 1-year mortality Harms severity: None Causal taxonomy used: None
Atzema, 2011 ⁵²	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 82 Annual ED volume: Multiple Ownership: Multiple	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Pre/post comparison Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Enhanced Feedback for Effective Cardiac Treatment study Dates: 2004 to 2005	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients who were admitted to an acute care hospital with a most responsible diagnosis of acute myocardial infarction. Total N: 6605 Age: Male, n (%): 4100 (62) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Multiple definitions Conceptual harms definition: Unclear or NR Harms severity: None Causal taxonomy used: None
Schrock, 2012 ⁵³	Patient type: General ED Patient age: Unclear or NR	Country: US Region, if US: Midwest Urban/rural:	Study design: Retrospective cohort Comparison group: Concurrent control	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: All	Care delivered entirely within ED: Unclear or NR Consultants involved:	Conceptual diagnostic error definition: ED diagnosis disagrees with neurologist diagnosis

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Public	Urban / metropolitan	Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2004 to 2007	subjects aged 18+ years who received an ED diagnosis of transient ischemic attack. Total N: 429 Age: Mean, 60, 57 Male, n (%): 161 (38%) Race, n (%): White, 229 (53%) Black/African American, 156 (36%)	Neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: neurologists Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Augustin, 2011 ⁵⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2000 to 2005	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Other: underwent appendectomy Total N: 380 Age: Mean, 34 Range, 6 to 79 Male, n (%): 231 (61%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Surgical Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Tsivgoulis, 2011 ⁵⁵	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: West Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Stroke registry data Numerator: Numerator and denominator Named data source: Barrow Neurological	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Acute ischemic stroke admissions treated with 0.9 mg/kg dose of intravenous tPA within 3 hours of stroke onset Total N: 483 Age: Mean, 67 Male, n (%): 270 (56) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without	Conceptual diagnostic error definition: stroke mimic Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
			Institute stroke database Dates: 2003 to 2008		treatment was handled: Unclear or NR	
Seetahal, 2011 ⁵⁶	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: All US Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator only (error/harm) Named data source: National Inpatient Sample Dates: 1998 to 2007	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Other: with appendectomy Total N: 475651 Age: Median, 42 Male, n (%): 15832 (3%) Race, n (%): White, 30748 (6%) Black/African American, 4061 (1%)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Willner, 2012 ⁶	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Private, for profit	Country: US Region, if US: West Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator Named data source: EHRs Dates: 2005 to 2008	Disease specificity: Not restricted by diseases Diseases studied: Other Other inclusion criteria: Other: excluded trauma patients initially treated at other institutions and transferred directly to an inpatient unit Total N: 324 Age: Median, 7.5 Male, n (%): 193 (59.6) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: trauma tea: pediatric EM attending, pediatric surgery attending or fellow, ED residents, surgical residents, pediatric ICU and pediatric ED nurses, radiologists, orthopedics Non-physicians involved: ED nurses, pediatric ICU nurses Non-EM physicians involved: Radiologist, orthopedics, surgery Trainees involved: Included trainees How left without	Conceptual diagnostic error definition: Delayed diagnosis of injury: a previously unsuspected injury attributable to trauma greater than 12 hours after presentation Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					treatment was handled: Unclear or NR	
Mounts, 2011 ⁵⁷	Patient type: General ED Patient age: Both adults and children Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Private, for profit	Country: US Region, if US: South Urban/rural: Unclear or NR	Study design: Cross-sectional Comparison group: None Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Discrepancy folder Dates: 2006 to 2009	Disease specificity: Multiple Diseases Diseases studied: Fractures Other inclusion criteria: Other: Total N: Age: Mean, 9.5 Range, 3 months to 20 years Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologist Non-physicians involved: Emergency physicians only Non-EM physicians involved: Pediatricians Trainees involved: Fully-trained emergency clinicians only How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: discordant interpretation ED extremity x-rays between pediatric ED providers and radiologists Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Calder, 2010 ⁵⁸	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 2 Annual ED volume: >=80,000 Ownership: Public	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2004 to 2004	Disease specificity: Not restricted by diseases Diseases studied: Other Other inclusion criteria: Multiple: Cognitive impairment due to an organic brain process or major psychiatric illness and no available substitute decision maker; critically ill or in too much distress to be capable of informed consent; unable to complete a telephone interview in English or French (or their substitute decision maker was unable); dis-charged home and did not have a telephone or other-wise unavailable for follow-up 2 weeks later (as determined at enrolment). Total N: 503	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: Multiple definitions Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
				Age: Median, 57 Range, 18-98 Male, n (%): 249 (50%) Race, n (%): NR		
Sevdalis, 2010 ⁵⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: UK Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Registry Comparison group: None Look back or look forward analysis: Unsure Data source: Electronic database of adverse events in NHS Numerator: Numerator only (error/harm) Named data source: NRLS Dates: 2003 to 2005	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Kuruville, 2011 ⁶⁰	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Young Stroke Registry Dates: 2001 to 2006	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients with a confirmed diagnosis of ischemic stroke who were seen at the outpatient stroke clinic of a university medical center Total N: 57 Age: Mean, 38.1 Male, n (%): 23 (40.4) Race, n (%): White, 40 (70) Black/African American, 16 (28)	Care delivered entirely within ED: Unclear or NR Consultants involved: vascular neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Patients were given a non-stroke diagnosis and either admitted to the hospital or discharged from the emergency department Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status:	Country: Western Europe Region, if US: Not	Study design: Case series Comparison group: None Look back or look forward analysis:	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: Other:	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: 31 Annual ED volume: Unclear or NR Ownership: Unclear or NR	applicable (non-US) Urban/rural: Unclear or NR	Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source: Dates: 2001 to 2002	We selected diagnosis-related settled and closed claim files. Total N: 50 Age: Mean, 44 Male, n (%): 28 (57) Race, n (%):	Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Pare, 2016 ⁶²	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs Number of EDs involved: 3 Annual ED volume: Multiple Ownership: Private, not for profit	Country: US Region, if US: Northeast Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2013 to 2015	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Treated at one of the affiliated EDs within 1 months preceding diagnosis for a visit attributed to AAD or during the same hospital visit Total N: 31 Age: Median, FOCUS 16 Non-FOCUS 13 Male, n (%): 18 (58%) Race, n (%): Black/African American, Non-white 1	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Multiple definitions Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Hendriks, 2015 ⁶³	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Ambidirectional Cohort Study Comparison group: Pre/post comparison Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator only (error/harm)	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 1102 Age: Mean, 25 Range, 2 to 94 Male, n (%): 572 (52%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: surgery Trainees involved: Unclear or NR How left without	Conceptual diagnostic error definition: diagnostic test accuracy (false positive) Conceptual harms definition: Unclear or NR Harms severity: Unclear or NR Causal taxonomy used: Unclear or NR

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Unclear or NR		Named data source: Dates: 2007 to 2012		treatment was handled: Unclear or NR	
Ferree, 2016 ¹	Patient type: General ED Patient age: Both adults and children Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban/rural Unclear or NR	Study design: Retrospective cohort Comparison group: Other (specify) Look back or look forward analysis: Data source: Other (specify) Numerator: Numerator and denominator Named data source: Dutch National Trauma Database (DNTD), electronic health record Dates: 2007 to 2012	Disease specificity: Multiple diseases Diseases studied: Other Other inclusion criteria: Mechanism (e.g., multi-trauma): inclusion: age=>16 years,, ISS=>16, body regions involved=>2, exclusion: dead on arrival, transferred <24h Total N: 172 Age: Mean, 44 Male, n (%): 118 (69%) Race, n (%):	Care delivered entirely within ED: Other location (specify) Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: %requiring surgical intervention Causal taxonomy used: None
Vinz, 2015 ⁶⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban/rural Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Malpractice claims Numerator: Numerator and denominator Named data source: Dates: 2000 to 2012	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 271 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Okafor, 2016 ⁶⁵	Patient type: General ED	Country: US Region, if	Study design: Case series	Disease specificity: Not restricted by diseases	Care delivered entirely within ED:	Conceptual diagnostic error definition: IOM/NAM

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: N: Annual ED volume: 60,000 to 79,999 Ownership: Unclear or NR	US: South Urban/rural: Urban / metropolitan	Comparison group: None Look back or look forward analysis: Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm) Named data source: Dates: 2009 to 2013	Diseases studied: OTHER MULTIPLE Other inclusion criteria: None: Total N: 214 Age: NR Male, n (%): NR Race, n (%): NR	Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: advanced practice professionals Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	2015 Conceptual harms definition: None Harms severity: Schiff (4-Tier) Causal taxonomy used: Graber 2005
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: South Urban/rural: Unclear or NR	Study design: Case series Comparison group: None Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2011 to 2013	Disease specificity: Multiple Diseases studied: OTHER MULTIPLE Other inclusion criteria: Symptom (e.g., dizziness): abdominal pain Total N: 100 Age: Mean, 41.4 Non-errors, 43.7 Errors Male, n (%): Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: surgical specialties Non-physicians involved: physician assistants and nurse practitioners Non-EM physicians involved: Unclear Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed Opportunity (Singh 2014) Conceptual harms definition: Unclear or NR Harms severity: Singh (8-Tier) Causal taxonomy used: Safer Dx (Singh)
Wireklint Sundström, 2015 ⁶⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban/rural:	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Admitted to hospital with final diagnosis of stroke (intracerebral hemorrhage, unspecified brain hemorrhage, cerebral infarction, and stroke not classified as	Care delivered entirely within ED: Stroke unit Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians	Conceptual diagnostic error definition: Time from arrival in hospital to radiological evaluation, arrival in ward, and thrombolysis or thrombectomy Conceptual harms definition: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Number of EDs involved: 9 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Multiple settings	health record data Numerator: Unclear or NR Named data source: NA Dates: 2010 to 2011	infarction or hemorrhage). Excluded patients with in-hospital stroke, subarachnoid hemorrhage, and extracranial hemorrhage. Total N: 1376 Age: Median, 79 Male, n (%): 702 (51) Race, n (%):	involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Harms severity: None Causal taxonomy used: None
Carlton, 2015 ⁶⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Public	Country: UK Region, if applicable (non-US): Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2013	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Symptom (e.g., dizziness); primary complaint of chest pain and for whom the treating physician in the ED determined that delayed troponin testing as required for the assessment of an acute coronary syndrome Total N: 912 Age: Mean, 58.0 Male, n (%): 546 (59.9) Race, n (%): White, 869 (95.3)	Care delivered entirely within ED: ED only Consultants involved: cardiology Non-physicians involved: Unclear or NR Non-EM physicians involved: acute general internist Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Goulet, 2015 ⁷⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 4 Annual ED volume: 60,000 to 79,999 Ownership: Public	Country: Western Europe Region, if applicable (non-US): Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2007 to 2011	Disease specificity: Not restricted by disease Diseases studied: OTHER MULTIPLE Other inclusion criteria: Unclear or NR: Total N: 1279 Age: Mean, 79 Male, n (%): 652 (51) Race, n (%): NR	Care delivered entirely within ED: ED to hospital Consultants involved: Included consultants (specify) Non-physicians involved: Included other ED clinicians (specify) Non-EM physicians involved: Included physicians with other training (specify) Trainees involved: Unclear or NR	Conceptual diagnostic error definition: Missed Opportunity (Singh 2014) Conceptual harms definition: MisDx-Related Harms (DNT, 2009) Harms severity: Death within 72 hours of hospital admission Causal taxonomy used: Unclear or NR

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					How left without treatment was handled: Unclear or NR	
Groot, 2016 ⁷¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2011 to 2012	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: patients with suspected STEMI undergoing invasive coronary angiography Total N: 827 Age: NR Male, n (%): 601 (73%) Race, n (%): NR	Care delivered entirely within ED: catheterization laboratory Consultants involved: Unclear or NR Non-physicians involved: EMS nurse Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: false-positive STEMI activation (patients referred for emergency invasive coronary angiography with suspected STEMI with no visible culprit stenosis on invasive coronary angiography) Conceptual harms definition: 30-day and 1-year all cause mortality Harms severity: None Causal taxonomy used: None
Holland, 2015 ⁷²	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: one transfer center serves 2 hospitals; unclear how referring hospitals are related Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if applicable (non-US) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2013	Disease specificity: Multiple diseases Diseases studied: Other Other inclusion criteria: Other: All patient transfer requests to the adult neurosurgical service Total N: 1323 Age: Male, n (%): 650 (49.1) Race, n (%):	Care delivered entirely within ED: transferred to neurosurgical service Consultants involved: neurosurgeons Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	Conceptual diagnostic error definition: diagnostic concordance Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Chu, 2015 ⁷³	Patient type: Unclear or NR Patient age: Unclear	Country: US Region, if applicable (non-US) US: All US	Study design: Retrospective cohort Comparison group:	Disease specificity: Single disease Diseases studied: Endocarditis	Care delivered entirely within ED: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Urban/rural: Unclear or NR	Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: California State Inpatient Database and State Emergency Department Database Dates: 2005 to 2011	Other inclusion criteria: Symptom (e.g., dizziness): with a first recorded diagnosis of ischemic stroke or TIA. Total N: 38485 Age: Male, n (%): Race, n (%):	Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	definition: None Harms severity: None Causal taxonomy used: None
Weinberg, 2010 ⁷⁴	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 2 Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2007 to 2008	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: Multiple: Inclusion criteria consisted of the following: (1) patients Total N: 212 Age: Median, 13 Male, n (%): Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Sonologists, radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Sonologists, radiologists Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: MisDx-Related Harms (DNT, 2009) Harms severity: None Causal taxonomy used: None
Vanbrabant, 2009 ⁷⁵	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural:	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Other: Inclusion (only patients managed by General Internal Medicine service--patients brought in for a medical problem that were not	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency	Conceptual diagnostic error definition: Patients return to the ED within 72 hours of a discharge with an new or additional diagnosis. Conceptual harms definition: Return to ED

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Unclear or NR	health record data Numerator: Numerator and denominator Named data source: Dates: 2006 to 2007	referred to a specific department (cardiology, GI, hepatology). Major trauma, burn, obstetric and pediatric patients were not included Total N: 4860 Age: NR Male, n (%): NR Race, n (%): NR	physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	within 72 hours of discharge. Harms severity: None Causal taxonomy used: None
Ravichandiran, 2010 ⁷⁶	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Recognized cases vs Missed cases Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 1993 to 2007	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: Multiple: The study sample included only cases for which the first physician visit was primarily for an isolated fracture. Cases were excluded when the child's clinical presentation was predominantly consistent with some other type of trauma, medical records were inaccessible, only metaphyseal corner chip fractures (usually asymptomatic) were present, or the cause of the fracture was indeterminate or accidental Total N: 258 Age: Mean, 8.28 for recognized cases, 9.24 for missed cases Male, n (%): (44.4 for recognized cases, 60.8 for missed cases) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: HSC SCAN consists of specialty pediatricians, psychologists, social workers, and nurse practitioners. Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Fully-trained emergency clinicians only How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Santos, 2009 ⁷⁷	Patient type: General ED Patient age: Both adults and children Teaching status: Non-academic/Non-	Country: US Region, if US: West Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Unclear or NR: Total N: 100	Care delivered entirely within ED: Surgery Consultants involved: Surgical Resident Non-physicians	Conceptual diagnostic error definition: Conceptual harms definition: Harms severity: Causal taxonomy used:

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR		denominator) Data source: Unclear or NR Numerator: Numerator and denominator Named data source: Dates: 2007 to 2007	Age: Mean, 22.6 Range, 2-81 Male, n (%): 61 (61) Race, n (%): NR	involved: Unclear or NR Non-EM physicians involved: Surgery Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Hoekstra, 2009 ⁷⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Multi-center study Number of EDs involved: 12 Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Multiple settings	Study design: Controlled trial Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Optimal Cardiovascular Diagnostic Evaluation Enabling Faster Treatment of Myocardial Infarction Dates: 2006 to 2008	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Symptom (e.g., dizziness): Patients presenting to the emergency department with chest pain and moderate to high risk for adverse clinical outcomes Total N: 1830 Age: Male, n (%): Race, n (%): NR	Care delivered entirely within ED: Catheterization laboratory Consultants involved: cardiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: STEMI detected with 80-lead ECG and not detected with 12-lead ECG Conceptual harms definition: all-cause mortality, recurrent myocardial infarction, percutaneous coronary intervention, coronary artery bypass grafting surgery, and rehospitalization for coronary complications at 30 days Harms severity: None Causal taxonomy used: None
Rizos, 2009 ⁷⁹	Patient type: specialized neurological ER Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume:	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Multiple: There were 2 cohorts: (a) all patients with a discharge diagnosis of 'stroke' and (b) patients with an admission diagnosis of stroke Total N: 13,635 p Age: Mean, 70	Care delivered entirely within ED: access to a stroke and neurointensive care unit Consultants involved: neurology specialist Non-physicians involved: Unclear or NR Non-EM physicians involved: neurology	Conceptual diagnostic error definition: If the admission diagnosis did not match the discharge diagnosis Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Ownership: Unclear or NR		Named data source: NA Dates: 2005 to 2007	Male, n (%): (52.2) Race, n (%):	Trainees involved: Fully-trained emergency clinicians only How left without treatment was handled: Unclear or NR	
McGann Donlan, 2009 ⁸⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2005 to Unclear or NR	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 137 Age: Mean, 36.3 Male, n (%): 72 (53%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Williams, 2009 ⁸¹	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Comparison of Patients With and Without a DDI Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator and denominator Named data source: Dates: 1997 to 2006	Disease specificity: Multiple diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: Process (e.g., left without treatment): Patients who were directly admitted from another hospital or died in the emergency department were excluded Total N: 1100- 44 with DDI Age: Range, 0-14 Male, n (%): Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was	Conceptual diagnostic error definition: Delayed diagnosis of injury (DDI)- DDI as any injury that was not identified until after a stable patient arrived at his or her hospital room. In patients immediately transported to the operating suite upon arrival, DDI was defined as an injury not identified Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					handled: Unclear or NR	
Chung, 2009 ²²	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: US Region, if US: West Urban/rural: Unclear or NR	Study design: Cross-sectional Comparison group: None Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2005 to 2007	Disease specificity: Multiple Diseases Diseases studied: Other Other inclusion criteria: : excluded patients with incomplete records Total N: 112 Age: Range, '102 adults and 10 children' Male, n (%): 72 (64%) Race, n (%): NR	Care delivered entirely within ED: Other location (specify) Consultants involved: Radiologists only, did not study EM providers Non-physicians involved: Emergency physicians only Non-EM physicians involved: only studied radiologists, not EM providers Trainees involved: Included trainees How left without treatment was handled:	Conceptual diagnostic error definition: discrepancy between resident and attending radiologist reading of trauma CT torso Conceptual harms definition: Changed in management as a result of discrepancy Harms severity: None Causal taxonomy used: None
Gaughan, 2009 ⁸²	Patient type: General ED Patient age: Unclear or NR Teaching status: Non-academic/Non-teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: UK Region, if US: Not applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2000 to 2006	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients undergoing surgery for emergency acute aortic aneurysm Total N: 98 Age: Median, 74 Range, 57 to 88 Male, n (%): 76 (77.6) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Misdiagnosis, time from presentation to diagnosis Conceptual harms definition: 30-day mortality Harms severity: None Causal taxonomy used: None
Gargano, 2009 ⁸³	Patient type: General ED Patient age: Unclear	Country: US Region, if US: Midwest	Study design: Registry Comparison group: None Look back or look forward	Disease specificity: Single disease Diseases studied: Stroke	Care delivered entirely within ED: Unclear or NR	Conceptual diagnostic error definition: door-to-doctor and door-to-

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 15 Annual ED volume: Multiple Ownership: Multiple	Urban/rural: Multiple settings	analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Michigan Acute Stroke Care Overview and Treatment Surveillance System Dates: 2002 to 2002	Other inclusion criteria: Other: Acute stroke or transient ischemic attack admissions Total N: Age: Male, n (%): 881 (48.5) Race, n (%): White, 1414 (73.6) Black/African American, 340 (17.7)	Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	imaging times Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Winkler, 2009 ⁸⁴	Patient type: Stroke Unit Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Registry Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: 1998 to 2007	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients treated with intravenous thrombolysis Total N: 250 Age: Mean, 67.8 Male, n (%): 147 (59) Race, n (%): NR	Care delivered entirely within ED: intensive care unit Consultants involved: neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: neurologists Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Stroke mimic (final diagnosis other than stroke) Conceptual harms definition: Rankin scale, death, occurrence of orolingual angioedema, and intracranial hemorrhage Harms severity: Rankin scale Causal taxonomy used: None
Kline, 2009 ²⁰	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000	Country: US Region, if US: South Urban/rural: Urban / metropolitan	Study design: Randomized controlled trial Comparison group: Concurrent control Look back or look forward analysis: Data source: Prospective data collection Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Other Other inclusion criteria: Other: Cocaine use or elopement from care Total N: 369 Age: Mean, 46 Male, n (%): (Control 39, Intervention 36) Race, n (%): (Control 44, Intervention 45) Black/African	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Triage nurse Non-EM physicians involved: Emergency medicine trained physicians only	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Private, not for profit		Named data source: Dates: 2005 to 2007	American, Control 57, Intervention 55	Trainees involved: Included trainees How left without treatment was handled: Excluded	
Filippi, 2008 ²³	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: US Region, if US: Northeast Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: First-year resident interpretation vs upper-level residents, residents vs attending radiologists Look back or look forward analysis: Unsure Data source: Multiple Numerator: Numerator and denominator Named data source: Dates: 2006 to 2007	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiology Non-physicians involved: Emergency physicians only Non-EM physicians involved: Included physicians with other training (specify) Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: a major discrepancy/error was 'one that could potentially adversely affect outcome, change management, or incur disability or mortality' Harms severity: None Causal taxonomy used: None
Rapezzi, 2008 ⁸⁵	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Registry Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: 1996 to 2006	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients who received a final diagnosis of spontaneous acute aortic aneurysm Total N: Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: in hospital diagnostic time < 12 hours (75th percentile) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Prabhakaran, 2008 ⁸⁶	Patient type: General ED	Country: US Region, if	Study design: Registry Comparison group:	Disease specificity: Single disease	Care delivered entirely within ED:	Conceptual diagnostic error definition: Diagnosis

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	US: Midwest Urban/rural: Urban / metropolitan	Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: Unclear or NR to Unclear or NR	Diseases studied: Stroke Other inclusion criteria: Symptom (e.g., dizziness): Patients with transient focal neurologic episodes lasting less than 24 hours and in whom the initial admitting diagnosis was transient ischemic attack Total N: 100 Age: Mean, 60.9 Male, n (%): 40 (40%) Race, n (%): White, 43 (43) Black/African American, 49 (49)	Stroke Service Consultants involved: Neurology residents Non-physicians involved: Unclear or NR Non-EM physicians involved: Neurology residents Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	of TIA was definite if an appropriate acute ischemic lesion was seen on brain imaging and probable if there was agreement by two stroke neurologists. The remaining TNA were classified according to etiology if found or unclassifiable if none was Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Moeller, 2008 ¹⁰	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2005 to 2006	Disease specificity: Multiple diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 493 Age: Male, n (%): Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Neurologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Rose, 2008 ⁸⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 46	Country: US Region, if US: South Urban/rural: Multiple settings	Study design: Registry Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients with a presumptive stroke-related admission diagnosis (ischemic stroke, hemorrhagic stroke, transient ischemic attack [TIA], stroke not specified).	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR	Conceptual diagnostic error definition: CT delay (hours) was calculated as the time from hospital arrival (ER triage) until initial brain-imaging. We also dichotomized delay time by the NINDS guideline of receipt of a CT scan within 25 minutes of

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Annual ED volume: Multiple Ownership: Multiple		Named data source: North Carolina Collaborative Stroke Registry Dates: 2005 to 2008	Total N: Age: Mean, 6984 Median, 46 Male, n (%): Race, n (%): White, 10779 (71) Black/African American, 3969 (26)	NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	hospital arrival. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Montmany, 2008 ⁵	Patient type: General ED Patient age: Both adults and children Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2006 to 2007	Disease specificity: Multiple diseases Diseases studied: Other inclusion criteria: : exclusion: patients younger than 16 years Total N: 122 Age: Mean, 44 Range, 16-99 Male, n (%): 93 (76%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: radiology, surgeon Non-physicians involved: Unclear or NR Non-EM physicians involved: radiologists, surgeons Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: Unclear or NR Causal taxonomy used: None
Piper, 2008 ⁸⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 2 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2006 to 2006	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Other: underwent urgent appendectomy Total N: 134 Age: Mean, 37 Male, n (%): 67 (50%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Parikh, 2008 ⁸⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: US Region, if US: South Urban/rural: Urban / metropolitan	Study design: Registry Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: 2000 to 2006	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Symptom (e.g., dizziness); Two cohorts: (1) Patients eligible for primary percutaneous coronary intervention and (2) excluded patients with atypical symptoms and/or presentations of STEMI that resulted in inherent delay in diagnosis and treatment Total N: 184 Age: Mean, 55 Male, n (%): 137 (74) Race, n (%): White, 62 (34) Black/African American, 45 (24)	Care delivered entirely within ED: cardiac catheterization laboratory Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: door-to-balloon time (cumulative time from emergency department presentation to first balloon inflation and concomitant reestablishment of antegrade blood flow in the infarct-related artery Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Kim, 2007 ⁹⁰	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2000 to 2006	Disease specificity: Single disease Diseases studied: Pneumonia Other inclusion criteria: None Total N: 109 Age: Mean, 5 Range, 0.3 to 19 Male, n (%): 58 (53%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Musunuru, 2007 ⁹¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching	Country: US Region, if US: South Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None Total N: 411 Age: Mean, 34.7	Care delivered entirely within ED: Unclear or NR Consultants involved: Surgeons Non-physicians	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR		method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2002 to 2004	Male, n (%): 230 (56%) Race, n (%): NR	involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Kline, 2007 ⁹²	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: South Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2002 to 2005	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Other: All chest computed tomographic angiography orders performed in the hospital (both inpatient and ED patients); included patients with a CTA interpretation as positive for a filling defect consistent with acute PE, and a systolic blood pressure consistently greater than 100 mm Hg; excluded patients with a comorbidity with a predicted 6-month mortality > 50%, treatment of any thrombosis during the same hospitalization; >24 hours elapsed since start of heparin therapy; overread of a initial positive CTA interpretation as negative for PE and no further imaging Total N: 207 Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: ED + n medical, surgical, and obstetric wards, and all adult intensive care units. Consultants involved: radiologists, cardiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Delayed diagnosis (pulmonary embolism was diagnosed by CTA ordered up to 48 hours after the patient left the ED) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Sun, 2007 ⁸	Patient type: General ED Patient age: Adults	Country: US Region, if US: West	Study design: Retrospective cohort Comparison group: None	Disease specificity: Single disease Diseases studied: Other	Care delivered entirely within ED: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Urban/rural: Urban / metropolitan	Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2005 to 2006	Other inclusion criteria: Multiple: Exclusion criteria included loss of consciousness related to a witnessed seizure, loss of consciousness after head trauma, ongoing confusion (including baseline cognitive impairment or dementia), intoxication, age younger than 18, inability to speak English or Spanish, do-not-resuscitate (DNR) or do-not-intubate (DNI) status, and lack of follow-up contact information. Total N: 463 Age: Range, 18 to 96 Male, n (%): 204 (44) Race, n (%): White, 357 (77)	Consultants involved: Unclear or NR Non-physicians involved: Nurses Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	definition: None Harms severity: None Causal taxonomy used: None
Jiménez Castro, 2007 ⁹³	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2003 to 2005	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: None: Patients who presented with symptoms of acute pulmonary embolism and had pulmonary embolism confirmed by objective testing Total N: 397 Age: Mean, 69 Male, n (%): 177 (45) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: Mortality during the first 3-months after diagnosis and treatment Harms severity: None Causal taxonomy used: None
Hansen, 2007 ⁹⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting:	Country: Canada Region, if applicable (non-US) Urban/rural:	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator)	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients with definite AAS, confirmed by imaging, operative	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR	Conceptual diagnostic error definition: incorrect initial misdiagnosis Conceptual harms definition: major bleeding or in-hospital mortality Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Urban / metropolitan	Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2000 to 2004	findings, or postmortem examination Total N: 66 Age: Mean, 62 Range, 19 to 87 Male, n (%): 50 (76) Race, n (%): NR	NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Vermeulen, 2007 ⁹⁵	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs Number of EDs involved: 147 Annual ED volume: Multiple Ownership: Unclear or NR	Country: Canada Region, if US: All US Urban/rural: Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Discharge Abstract Database and National Ambulatory Care Reporting System Dates: 2002 to 2005	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients admitted to any hospital though an ED with a diagnosis of nontraumatic subarachnoid hemorrhage Total N: 1507 Age: Mean, 57.9 Male, n (%): 580 (38%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed SAH was defined as the presence of an alternative ED main discharge diagnosis, including migraine/headache, neck pain, hypertension, sinusitis, stroke/transient ischemic attack, meningitis, syncope and collapse, or giant cell arteritis Conceptual harms definition: 30-day and 1-year mortality Harms severity: None Causal taxonomy used: None
Tzovaras, 2007 ⁹⁶	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Randomized controlled trial Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 78 Age: NR Male, n (%): 78 (100) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Unclear or NR		and denominator Named data source: Dates: 2002 to 2005		How left without treatment was handled: Unclear or NR	
Schull, 2006 ⁹⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Hospital setting: Multi-center study Number of EDs involved: 171 Annual ED volume: Multiple Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Discharge Abstract Database and the National Ambulatory Care Reporting System Dates: 2002 to 2003	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients admitted to hospital through an ED with a diagnosis of acute myocardial infarction Total N: 19663 Age: Mean, 68.3 Male, n (%): 12388 (63) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed acute myocardial infarction (the ED discharge diagnosis was chest pain, angina, shortness of breath, congestive heart failure, abdominal pain, heartburn, esophagitis, or gastritis, syncope/malaise) Conceptual harms definition: 30-day and 1-year mortality Harms severity: None Causal taxonomy used: None
Pehle, 2006 ⁹⁸	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 1998 to 2002	Disease specificity: Multiple diseases Diseases studied: Fractures Other inclusion criteria: Other: Patients who, within the shock space supply phase died, excluded from the analysis, there the early diagnosis not completed could be and due to the lowgen autopsy rate not confirmed and complete final diagnoses are present. Total N: 1,187 Age: Median, 40 Male, n (%): 71 (6%) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Gallagher, 2006 ¹³	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Randomized controlled trial Comparison group: Concurrent control Look back or look forward analysis: Not a cohort study Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2002 to 2004	Disease specificity: Single disease Diseases studied: Other Other inclusion criteria: Symptom (e.g., dizziness): inclusion: atraumatic abdominal pain Total N: 160 Age: Mean, 45.5 Male, n (%): 55 (34%) Race, n (%): Black/African American, 42 (26)	Care delivered entirely within ED: Unclear or NR Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Clinically important diagnostic error was defined as any disagreement between the initial provisional and final diagnosis that might reasonably be expected to have an adverse impact on the patient's health status. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Graff, 2006 ⁹⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Historical comparisons Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Connecticut Medicare Part A Dates: 1992 to 2001	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients with a principal diagnosis of acute myocardial infarction Total N: 7888 Age: Mean, 79.3 Male, n (%): 3707 (47) Race, n (%): White, 7391 (93.7)	Care delivered entirely within ED: Unclear or NR Consultants involved: cardiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Admission diagnosis differed from final diagnosis Conceptual harms definition: Mortality Harms severity: None Causal taxonomy used: None
England, 2006 ¹⁰⁰	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR	Country: UK Region, if US: Not applicable (non-US) Urban/rural:	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 311 Age: Range, 1 to 15	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Unclear or NR	method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 1999 to 2004	Male, n (%): 183 (59%) Race, n (%): NR	involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Ray, 2006 ¹⁸	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: Other (specify) Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2001 to 2002	Disease specificity: Multiple Diseases Diseases studied: Other Other inclusion criteria: Other: Age at least 65 years; acute dyspnea of less than two weeks' duration, a subjective criterion defined by the patient (the dyspnea was present if the patient answered one of the following questions in the affirmative: Are you breathless? Do you feel short of breath? Do you experience air hunger? Do you feel increased effort of breathing?); and one of the following objective criteria of ARF: a respiratory rate at least 25 minute ⁻¹ , an arterial partial pressure of oxygen (PaO ₂) of 70 mmHg or less, a peripheral oxygen saturation (SpO ₂) of 92% or less while breathing room air, and an arterial partial pressure of CO ₂ (PaCO ₂) of 45 mmHg or more with an arterial pH of 7.35 or less. Total N: 514 Age: Mean, 80+/-9 Male, n (%): 253 (49%) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Fully-trained emergency clinicians only How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Nuñez, 2006 ¹⁰¹	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Case-control Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2004 to 2004	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Exclusion criteria were age Total N: 500 Age: Mean, 45 Male, n (%): 245 (49) Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Nurse Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Discordance between 1st and final diagnosis in ED records for cases of dx error, or the primary health care medical records for controls Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Hallas, 2006 ¹⁰²	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Rural	Study design: Case-control Comparison group: A control group consisting of 100 patients was randomly selected from all patients who were correctly diagnosed with a fracture on their first visit to the ED during the two year period. Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2002 to 2004	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: None: Total N: 161 Age: Mean, 44 Male, n (%): 77 (48) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologist and surgery Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Guly HR: Diagnostic errors in an accident and emergency department. Emerg Med J 2001, 18:263-269 Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Gouin, 2006 ¹⁰³	Patient type: General ED Patient age: Children only Teaching status:	Country: Canada Region, if US: Not applicable	Study design: Retrospective cohort Comparison group: Pre/post comparison Look back or look forward	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Outside films as well as	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians	Conceptual diagnostic error definition: Discrepancy between emergency physician and radiologist read of plain

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Public	(non-US) Urban/rural: Urban / metropolitan	analysis: Unsure Data source: Other (specify) Numerator: Numerator and denominator Named data source: Dates: 2001 to 2002	ultrasonograms, magnetic resonance imaging, computed tomography, and bone scan studies were excluded. Total N: Age: Mean, 6 Male, n (%): NR Race, n (%): NR	only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Included physicians with other training (specify) Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	films Conceptual harms definition: Discrepancy in radiology report leading to a change in patient management Harms severity: None Causal taxonomy used: None
York, 2005 ¹⁰⁴	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2002 to 2004	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 197 Age: Mean, 10.5 Range, 2-17 Male, n (%): 122 (62) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: radiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Tudela, 2005 ¹⁰⁵	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume:	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator only (error/harm)	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: discharged from the emergency medical area (excluding going the areas of traumatology, surgery, pediatrics and gynecology) Total N: 669 Age: Mean, 66.1	Care delivered entirely within ED: multiple Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	20,000 to 39,999 Ownership: Public		Named data source: Dates: 2001 to 2003	Male, n (%): 416 (62%) Race, n (%): NR	Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	
Rønning, 2005 ¹⁰⁶	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Unclear or NR Numerator: Numerator and denominator Named data source: NA Dates: 2004 to 2004	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients admitted to the stroke unit for suspected stroke Total N: 354 Age: Mean, 70 Range, 21 to 96 Male, n (%): 171 (48%) Race, n (%): NR	Care delivered entirely within ED: stroke unit Consultants involved: neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Suspected stroke, but did not have stroke Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Beaver, 2005 ¹⁰⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Multiple EDs transferred patients to one referral hospital Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: South Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2002 to 2003	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients with thoracic aortic dissection transferred to hospital Total N: 100 Age: Mean, 63 Range, 11 to 87 Male, n (%): 63 (63%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: radiologists Non-physicians involved: nurses Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: discrepancy between transferring and actual diagnosis Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Garfield, 2004 ¹⁰⁸	Patient type: General ED	Country: US Region, if	Study design: Retrospective cohort	Disease specificity: Single disease	Care delivered entirely within ED:	Conceptual diagnostic error definition: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	US: Northeast Urban/rural: Urban / metropolitan	Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2002 to 2003	Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 124 Age: Male, n (%): 75 (60) Race, n (%): NR	Unclear or NR Consultants involved: Surgery Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Soundappan, 2004 ¹⁰⁹	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: Comparison with and without missed injuries by tertiary survey Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2002 to 2003	Disease specificity: Single disease Diseases studied: Other Other inclusion criteria: Outcome severity (e.g., only death): inclusion: Trauma patients with an Injury Severity Score of 9 or above were included the study. Total N: 76 Age: Mean, 8.4 years Range, 1 month -15 years Male, n (%): 50 (66%) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: trauma team at the hospital included the surgical fellow or registrar, emergency fellow or registrar, anesthetic registrar, intensive care registrar, emergency department nurses, and radiographer. Non-physicians involved: Nurses, radiographer Non-EM physicians involved: trauma team at the hospital included the surgical fellow or registrar, emergency fellow or registrar, anesthetic registrar, intensive care registrar, emergency	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					department nurses, and radiographer. Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	
Heckmann, 2004 ¹¹⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Suburban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Unclear or NR Numerator: Numerator and denominator Named data source: Dates: 2002 to 2003	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients suspected of stroke Total N: 462 Age: Mean, 64.2 Range, 17 to 94 Male, n (%): 265 (57%) Race, n (%): NR	Care delivered entirely within ED: stroke unit Consultants involved: neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Admitted to stroke unit, but did not have a stroke Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Corral Gudino, 2003 ¹¹¹	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2001 to 2002	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Multiple: with a definite diagnosis of PE(probability of suffering from the disease higher than 80%) Total N: 58 Age: Mean, 71.5 (70, 76) Male, n (%): 25 (43%) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Conti, 2003 ¹¹²	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Unclear or NR Numerator: Numerator and denominator Named data source: NA Dates: 1999 to 2001	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: Symptom (e.g., dizziness): Patients presenting with chest pain and normal/non-diagnostic ECG Total N: 306 Age: Mean, 59.7 Male, n (%): 200 (65) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Serum cardiac injury markers as compared to scan strategy in diagnosing CAD in ED patients with chest pain and non-diagnostic ECG Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Harbison, 2003 ¹¹³	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: UK Region, if applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2000 to 2000	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients referred to stroke service Total N: 487 Age: Mean, 72 Range, 22 to 98 Male, n (%): 234 (48) Race, n (%): NR	Care delivered entirely within ED: transferred to stroke service Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Accuracy of stroke diagnosis Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Liberman, 2020 ¹¹⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting:	Country: US Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Process (e.g., left without treatment): ED patients with a discharge diagnosis of headache; excluded	Care delivered entirely within ED: ED only Consultants involved: Neurology Non-physicians involved: Unclear or NR	Conceptual diagnostic error definition: Hospitalizations for new cerebrovascular event (ischemic stroke, intracranial hemorrhage, venous infarction, or

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Single health system, multiple EDs Number of EDs involved: 4 Annual ED volume: Unclear or NR Ownership: Unclear or NR		(symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator Named data source: NA Dates: 2013 to 2018	patients who were admitted to a hospital from an index emergency department visit; Hospitalizations for transient ischemic attack (TIA) or cervicocranial dissection without evidence of cerebral infarction or intracranial hemorrhage were not included as the outcome of interest. Total N: 28,121 Age: Mean, 43 Male, n (%): 7935 (28.2) Race, n (%): White, 2131 (8%) Black/African American, 9667 (34%)	NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	intracerebral hemorrhage) within 1 year after index ED visit where patient was discharged for headache Conceptual harms definition: Mortality Harms severity: None Causal taxonomy used: None
Gleason, 2020 ¹¹⁵	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 3 Annual ED volume: Unclear or NR Ownership: Public	Country: US Region, if US: Other Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2019 to 2019	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Symptom (e.g., dizziness): People aged 18 and older who were seen at the ED within the past seven days with one or more common chief complaints (chest pain, upper back pain, abdominal pain, shortness of breath/cough, dizziness, and headache) and one or more chronic conditions (hypertension, diabetes, history of stroke, arthritis, cancer, heart disease, osteoporosis, depression, and/or chronic obstructive lung disease) were eligible to join the study. Total N: 59 Age: Mean, 49.88 Range, 21-83 Male, n (%): (36%) Race, n (%): White, 31 (53%) Black/African American, 24 (41%)	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Goyal, 2020 ¹¹⁶	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 7 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: All US Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Pediatric Emergency Care Applied Research Network (PECARN) Registry Numerator: Numerator and denominator Named data source: Pediatric Emergency Care Applied Research Network (PECARN) Registry Dates: 2014 to 2018	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None Total N: 7,417 Age: Male, n (%): 4458 (60.1) Race, n (%): White, 4057 (54.7)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Avelino-Silva, 2020 ¹¹⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: National Hospital Ambulatory Medical Survey Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: All US Urban/rural: Unclear or NR	Study design: Secondary analysis on National Hospital Ambulatory Medical Survey Comparison group: None Look back or look forward analysis: Data source: National Hospital Ambulatory Medical Survey Numerator: Numerator and denominator Named data source: NHAMSC Dates: 2005 to 2010	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: Other: admitted from EDs to hospitals Total N: Age: Mean, 79 Male, n (%): (42) Race, n (%): (12) (84)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: We defined "substantial diagnostic discrepancy" as present when the admission and discharge diagnoses were classified as distantly related (category 3) or unrelated (category 4), or absent in other situations. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Settelmeier, 2020 ¹¹⁸	Patient type: Chest pain unit Patient age: Adults only Teaching status:	Country: Western Europe Region, if US: Not	Study design: Registry Comparison group: None Look back or look forward analysis: Data source: Electronic	Disease specificity: Single disease Diseases studied: Other Other inclusion criteria: Other: Only patients consenting to be	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Public	applicable (non-US) Urban/rural: Multiple settings	health record data Numerator: Numerator only (error/harm) Named data source: CPU registry Dates: 2008 to 2014	contacted for follow-up (FU) were included in the present analysis Total N: 5,259 (Age: Mean, 70.5 years [f] vs. 65.6 years [m] Male, n (%): (62.2) Race, n (%):	Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Gold, 2020 ¹¹⁹	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: All US Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator only (error/harm) Named data source: IBM MarketScan Research Databases Dates: 2011 to 2015	Disease specificity: Single disease Diseases studied: Pneumonia Other inclusion criteria: Other: We also excluded patients with insurance plans that did not contribute prescription drug data to MarketScan (n = 886), for a final cohort of 3983 patients. Total N: 3938 Age: Median, 60 for +, 45 for - Male, n (%): 1910 (48.5) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Sharp, 2020 ¹²⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single health system, multiple EDs Number of EDs involved: 14 Annual ED volume: Unclear or NR	Country: US Region, if US: West Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator Named data source: IBM MarketScan Research Databases Dates: 2009 to 2017	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients with an acute myocardial infarction discharge Total N: 44473 (LBA) 325,088 (LFA) Age: Mean, 68.0 (LBA), 48.9 (LFA) Male, n (%): 28137 (LBA), 139126 (LFA) (63.3% (LBA),	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: MisDx-Related Harms (DNT, 2009) Harms severity: None Causal taxonomy used: IOM/NAM 2015

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Unclear or NR			42.8% (LFA) Race, n (%): White, 23,542 (LBA), 125,132 (LFA) (52.9% (LBA), 38.5% (LBA)) Black/African American, 5,111 (LBA), 43,447 (LFA) (11.5% (LBA), 13.4% (LFA))	How left without treatment was handled: Unclear or NR	
Mansella, 2020 ¹²¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US): Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2011 to 2013	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Other: Patients who received any cardiology workup (at least an ECG) or any pulmonary workup (at least a chest X-ray) Total N: 226 Age: Median, 68.5 Male, n (%): 124 (54.9) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiology Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Early (PE confirmed during early workup in the ED) vs. delayed (PE confirmed by imaging or autopsy during delayed workup) diagnosis Conceptual harms definition: In-hospital mortality Harms severity: None Causal taxonomy used: None
Smidfelt, 2020 ¹²²	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs Number of EDs involved: 11 Annual ED volume: Multiple Ownership: Public	Country: Western Europe Region, if applicable (non-US): Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Swedish Cause of Death Registry and Swedish National Registry for Vascular Surgery Dates: 2010 to 2015	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients who were treated with open repair or EVAR for ruptured abdominal aortic aneurysm Total N: 455 Age: Mean, 79.1-79.5 Male, n (%): 322 (71%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: radiologist Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Patients who did not meet any of these criteria: 1) aortic aneurysm or rupture was mentioned at the preliminary or differential diagnosis by the first physician to assess patient in ED, 2) the patient was referred from the ED for an acute CT scan of the a Conceptual harms definition: In-hospital mortality or 30-day mortality Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
						Causal taxonomy used: None
Saaristo, 2020 ¹⁵	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Public	Country: Western Europe Region, if applicable (non-US): Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator and denominator Named data source: Dates: 2015 to 2016	Disease specificity: Single disease Diseases studied: Other Other inclusion criteria: None: Total N: 10,609 Age: Mean, 38 yr Median, 32 yr Male, n (%): (40%) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Included consultants (specify) Non-physicians involved: Emergency physicians only Non-EM physicians involved: surgeons Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: Short-term (48 hr) return to ED Harms severity: None Causal taxonomy used: None
Bourdon, 2020 ¹²³	Patient type: Eye and Ear ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: a primary and secondary ophthalmic emergency office Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US): Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator and denominator Named data source: Dates: 2020 to 2020	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 500 Age: NR Male, n (%): 303 (61%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: ophthalmologist Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Kerkman, 2020 ¹²⁴	Patient type: General ED Patient age: Unclear or NR Teaching status:	Country: Western Europe Region, if applicable (non-US): Urban/rural: Unclear or NR	Study design: Registry Comparison group: Concurrent control Look back or look forward analysis: Look back	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other:	Care delivered entirely within ED: EMS Consultants involved: Cardiologist	Conceptual diagnostic error definition: System delay time (time from ambulance dispatch until reaching the patient and

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Hospital setting: Single health system, multiple EDs Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	applicable (non-US) Urban/rural: Urban / metropolitan	method (disease denominator) Data source: data set Numerator: Numerator and denominator Named data source: NA Dates: 2015 to 2016	Patients with an acute coronary syndrome identified as STEMI Total N: 787 Age: Mean, 61(men)-68(women) Male, n (%): 558 (71) Race, n (%): NR	Non-physicians involved: Nurse, ambulance staff Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	recording the first ECG, from STEMI diagnosis to arrival at the pPCI center, from pPCI center to arterial access and from arterial access to balloon inflation in the culprit ar Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Chan, 2020 ¹²⁵	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2015 to 2017	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Other: Patients with a positive pulmonary embolism on computed tomography pulmonary angiogram, high-probability ventilation perfusion scan, or intermediate-probability VQ scan with positive DVT on duplex ultrasound Total N: 302 Age: Range, 38.1% =85 Male, n (%): 100 (33%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Diagnosis more than 7 days after symptom onset Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Mattijssen-Horstink, 2020 ¹²⁶	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 20,000 to 39,999 Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Hospital complication list and EHRs Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: Symptom (e.g., dizziness): Wounds excluded Total N: 26246 Age: Male, n (%): Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved:	Conceptual diagnostic error definition: Guly HR. Diagnostic errors in an accident and emergency department. Emerg Med J. 2001;18(4):263-9 Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
			Named data source: Dates: 2012 to 2017		Unclear or NR How left without treatment was handled: Unclear or NR	
Lieberman, 2020 ¹²⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Florida Agency for Health Care Administration and New York Statewide Planning and Research Cooperative System Dates: 2005 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Process (e.g., left without treatment): Patients with an index hospitalization for cervicocephalic artery dissection Total N: 7090 Age: Mean, 52.7 Male, n (%): 3909 (55.1) Race, n (%): White, 4799 (68%) Black/African American, 819 (12%)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Probable ED misdiagnosis is having had an ED treat-and-release visit for signs and symptoms related to dissection in the 14 days before dissection hospitalization Conceptual harms definition: Stroke and death Harms severity: None Causal taxonomy used: None
Zaschke, 2020 ¹²⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Transferred from another regional hospital Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2016	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients with non-iatrogenic type A aortic dissection Total N: 350 Age: Mean, 63.2 Male, n (%): 222 (63.4) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Initial misdiagnosis vs. aortic dissection included as sole or differential diagnosis in initial workup Conceptual harms definition: 30-day mortality Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Comolli, 2020 ¹²⁹	Patient type: Ear, nose, and throat ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2013 to 2013	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Symptom (e.g., dizziness): Patients with vertigo Total N: 286 Age: Mean, 49 Male, n (%): 129 (45.1) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Internal medicine, surgery, shock room, neurology Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Osterwalder, 2020 ¹⁴	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2013 to 2015	Disease specificity: Multiple diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Pediatric and obstetric patients presenting to facilities nearby were not included. Patients undergoing life-saving interventions and patients who were unconscious, intoxicated, or could not be interviewed due to mental issues were not included. Multiple presentation was not excluded Total N: 3960 Age: Median, 47 for abdominal pain, 51 for no abdominal pain Male, n (%): (47.3 % abdominal pain, 52.3% no abdominal pain) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Nurses Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Cifra, 2020 ¹³⁰	Patient type: Unclear or NR Patient age: Unclear	Country: US Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group:	Disease specificity: Single disease Diseases studied: Sepsis	Care delivered entirely within ED: Unclear or NR	Conceptual diagnostic error definition: the Symptom-Disease Pair

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Urban/rural: Unclear or NR	Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project (HCUP) Dates: 2010 to 2011	Other inclusion criteria: None: Total N: 1945 Age: Mean, 8.2 Male, n (%): 1035 (52.9) Race, n (%): White, 651 (35.2) Black/African American, 330 (17.9)	Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Analysis of Diagnostic Error (SPADE) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Fasen, 2020 ¹³¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2019 to 2019	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients with a clinical diagnosis of acute ischemic stroke who underwent CTA to evaluate LVO of the proximal anterior circulation; excluded patients with suspected posterior circulation symptoms or occlusion Total N: 520 Age: Mean, 72 Range, 19 to 100 Male, n (%): 255 (49) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: neuroradiologists, non-neuroradiologists, or senior radiology residents Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed LVO at initial interpretation Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Mahajan, 2020 ¹³²	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR	Country: US Region, if US: All US Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 95315 for adults and 21363 for children	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians	Conceptual diagnostic error definition: We defined a potentially missed diagnosis of appendicitis as an initial (or index) ED visit at which

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR		method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Clinformatics Data Mart (Optum Insights) Dates: 2010 to 2017	Age: Mean, 43.9 for adults and 12 for children Male, n (%): 47276 for adults and 12265 for children (49.6 for adults and 57.4 for children) Race, n (%): White, 53199 for adults and 12281 for children (55.8 for adults and 57.5 for children) Black/African American, 5929 for adults and 991 for children (6.2 for adults and 4.6 for children)	involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	a patient presented with any single undifferentiated symptom or combination of undifferentiated symptoms associated with appendicitis for which the patient Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Husabø, 2020 ¹³³	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 24 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2015 to 2017	Disease specificity: Single disease Diseases studied: Sepsis Other inclusion criteria: None: Total N: 1559 Age: Mean, 67.0 Median, 71 Male, n (%): 800 (51.3) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Mahajan, 2020 ¹³⁴	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 3 Annual ED volume: Unclear or NR Ownership: Public	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: HDP or No HDP Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Preeclampsia/eclampsia Other inclusion criteria: Other: All postpartum women who presented to three tertiary care EDs within 42 days of delivering a live or stillborn infant in Calgary, Alberta, Canada over the study period were eligible. Total N: 119 Age: Median, 31 for HDP, 29.5	Care delivered entirely within ED: ED only Consultants involved: Internal medicine, OBGYN, Neurology, cardiology Non-physicians involved: Unclear or NR Non-EM physicians involved: Internal medicine, OBGYN,	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
			Named data source: Dates: 2011 to 2012	for No HDP Range, 19–46 for HDP, 18–37 for no HDP Male, n (%): 0 (0) Race, n (%): NR	Neurology, cardiology Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: UK Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Cross-sectional Comparison group: None Look back or look forward analysis: Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm) Named data source: National Reporting and Learning System Dates: 2013 to 2015	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: None: Total N: 2288 Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Society to Improve Diagnosis in Medicine Conceptual harms definition: None Harms severity: World Health Organization International Classification for Patient Safety Causal taxonomy used: Carson-Stevens 2015
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2005 to 2015	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: Outcome severity (e.g., only death): resulted in an ICU admission Total N: 254 Age: Male, n (%): 19 for deviation 115 no deviation Race, n (%): White, 22 for deviation, 141 no deviation	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Michelson, 2019 ¹³⁷	Patient type: General ED Patient age: Children only Teaching status: Non-academic/Non-teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: PHIS and BCH EHRs Dates: 2008 to 2018	Disease specificity: Multiple diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: Other: We excluded cases from the manual record review if they did not have sufficient information in the medical record to make an outcome determination (for instance, because of incomplete or missing documentation). Total N: 158 Age: Mean, 8.7 Male, n (%): 91 (58%) Race, n (%): White, 67 (42%) Black/African American, 12 (8%)	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed Opportunity (Singh 2014) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Ois, 2019 ¹³⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Registry Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: SAH-Basicmar Dates: 2007 to 2017	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients admitted to hospital with a diagnosis of spontaneous (nontraumatic) aneurysmal and nonaneurysmal SAH Total N: 400 Age: Mean, 56.02 Range, 17 to 97 Male, n (%): 155 (38.8) Race, n (%): NR	Care delivered entirely within ED: tertiary stroke center Consultants involved: neurologist, neurointensivist, neurovascular interventionists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Failure to correctly identify a subsequently documented SAH in the first physician evaluation Conceptual harms definition: modified Rankin Scale score of 3 to 6 Harms severity: Modified Rankin Scale Causal taxonomy used: None
Liberman, 2020 ¹³⁹	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status:	Country: US Region, if US: All US Urban/rural:	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Cases with a final diagnosis of	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Multiple settings	method (disease denominator) Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source: Controlled Risk Insurance Company (CRICO) Strategies Comparative Benchmarking System (CBS) Dates: 2006 to 2016	stroke Total N: 235 diagnostic error claimants (demographics not presented separately for ED claims) Age: Range, 18-45 (25.1%); >= 45 (70.2%); unknown (4.7%) Male, n (%): 118 (50.2) Race, n (%):	Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Harms severity: NAIC Scale (9-Tier) Causal taxonomy used: CRICO Taxonomy
Vasconcelos-Castro, 2020 ¹⁴⁰	Patient type: General ED Patient age: Children only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban/rural Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2017 to 2018	Disease specificity: Single disease Diseases studied: Other Other inclusion criteria: Other: Four patients were excluded owing to undescended testis and neonatal presentation. Seven patients were excluded owing to lack of information about the precise location of pain on set Total N: 73 Age: Median, 15.3 Male, n (%): 73 (100) Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Wilson, 2020 ¹⁴¹	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume:	Country: US Region, if US: All US Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source:	Disease specificity: Single disease Diseases studied: Venous thromboembolism Other inclusion criteria: Other: Jury verdicts involving pulmonary embolism or deep vein thrombosis; included cases involving surgical management, medical management, interventional management, and anesthesia	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved:	Conceptual diagnostic error definition: Reason the physician was being held liable Conceptual harms definition: The complication endured by the patient for which the defendant was being held liable Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Multiple Ownership: Unclear or NR		Westlaw database Dates: 1987 to 2018	Total N: 277 Age: NR Male, n (%): NR Race, n (%): NR	Unclear or NR How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Czolgosz, 2019 ¹⁴²	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Private, not for profit	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2012 to 2014	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Transfer > 12 hours after admission, direct admission from other facility (no ED care), Non-medical (surgical) admissions, Direct admissions to PICU from ED (no medical floor), duplicate patient records, NICU admissions Total N: 164 Age: Median, 30 months Range, 0 to 19 Male, n (%): 86 (52.4%) Race, n (%): NR	Care delivered entirely within ED: ED to PICU Consultants involved: PICU Non-physicians involved: pediatricians and Nurse practitioners Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2015 to 2016	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: None: Total N: 697 Age: Mean, 51.6 Male, n (%): 342 (49.1) Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: The accuracy of provisional diagnoses was assessed by comparing the absolute agreement between the provisional diagnosis in the emergency department (ED) and the final diagnosis given by the ophthalmology resident. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Liberman, 2019 ¹⁴⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 3 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control analysis: Look back or look forward method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2005 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients who were discharged with a first-recorded diagnosis of cerebral venous thrombosis Total N: 53 Age: Mean, 47.8 Male, n (%): 21 (40%) Race, n (%): Black/African American, 21 (44.7)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	Conceptual diagnostic error definition: Missed Opportunity (Singh 2014) Conceptual harms definition: Intracerebral hemorrhage, in-hospital death, discharge disposition, and modified Rankin Scale Harms severity: None Causal taxonomy used: Safer Dx (Singh)
Fernholm, 2019 ¹⁴⁵	Patient type: NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source: nationwide patient-reported harm database Dates: 2011 to 2016	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: None: Total N: Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Aneiros, 2019 ¹⁴⁶	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban/rural:	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator)	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 1736 Age: Range, 0 to 15 Male, n (%): 1088 (63%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Unclear or NR	Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2000 to 2013		Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Sadighi, 2019 ¹⁴⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs Number of EDs involved: 3 Annual ED volume: Multiple Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: Unclear or NR to Unclear or NR	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients who were hospitalized with the admission diagnosis of transient ischemic attack or were referred with the referral diagnosis of transient ischemic attack Total N: 254 Age: Mean, 68.7 Male, n (%): 104 (40.9) Race, n (%): White, 243 (95.7)	Care delivered entirely within ED: Unclear or NR Consultants involved: general neurologist within 24 hours Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Admission diagnosis was consistent with the final diagnosis Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Hautz, 2019 ¹⁴⁸	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2015 to 2016	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: All patients of 18 years or older hospitalized from the emergency room (ER) to any internal medicine (IM) ward were included in the study and followed up until hospital discharge or death. Patients were excluded if admitted to IM for palliative care or for social reasons or if they presented with an acute traumatic injury and	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: MisDx-Related Harms (DNT, 2009) Harms severity: None Causal taxonomy used: Kachalia 2007

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
				were admitted to IM for reasons of age, comorbidities, or surgical ward crowding Total N: 755 Age: Mean, 65.14 Male, n (%): 433 (57.3) Race, n (%): NR	How left without treatment was handled: Unclear or NR	
Degheim, 2019 ¹⁴⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 2 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2015 to 2016	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: All STEMI catheterization laboratory activations Total N: 375 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: cardiac catheterization lab Consultants involved: Cardiologist Non-physicians involved: EMTs Non-EM physicians involved: cardiologists Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Cardiac catheterization lab (activated by EMT or ED physician) cancelled by interventional cardiologist Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Chan, 2019 ¹⁵⁰	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2017	Disease specificity: Single disease Diseases studied: Testicular torsion Other inclusion criteria: Symptom (e.g., dizziness): Patients with greater than 48 h of pain were excluded from this analysis as these patients would have either chronic scrotal pain or perceived to have low testicular salvage potential, which may result in bias toward a disproportionately higher orchiectomy rate. Total N: 46 Age: NR Male, n (%): 46 (100) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Nurses Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Ohle, 2019 ¹⁵¹	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Multi-center study Number of EDs involved: 2 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2002 to 2014	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: Patients who presented to an ED or a regional cardiac referral center with acute onset of non-traumatic abdominal/back/chest/flank pain and a new diagnosis of acute aortic dissection Total N: 194 Age: Mean, 65 Male, n (%): 129 (66.7) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: A missed case of AAD was defined by failure to diagnose within the ED, treatment for an alternative diagnosis (i.e., anticoagulation for a pulmonary embolism) within the ED, or re-presentation within 14 days of the initial visit with a new diagnosis of AA Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Williams, 2019 ¹⁵²	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 37 Annual ED volume: Multiple Ownership: Multiple	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2011 to 2016	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients presenting to the hospital with STEMI and failed to receive timely reperfusion therapy Total N: 1392 Age: Mean, 63.9 -66.3 Male, n (%): 1020 (73%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Cardiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Patients who presented with a STEMI and who were not identified, had treatment commenced, or it was clear on review that STEMI was not considered within a four-hour period were defined as missed acute myocardial infarction Conceptual harms definition: Inpatient mortality Harms severity: None Causal taxonomy used: None
Gergenti, 2019 ¹⁵³	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED	Country: US Region, if US: Northeast Urban/rural: Urban/rural: Suburban / micropolitan	Study design: Retrospective cohort Comparison group: Unclear or NR Look back or look forward analysis: Look back method (disease denominator)	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 174 Age: Mean, 42.9 Range, 0-88 Male, n (%): 58 (33)	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Private, not for profit		Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2013 to 2014	Race, n (%): White, 153 (88) Black/African American, 10 (6)	physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	
Dubosh, 2019 ¹⁵⁴	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: State Emergency Department Databases and State Inpatient Databases Dates: 2006 to 2012	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Using the ED visit data from the 6 states, included: ED patients (18 years) discharged (i.e., treat and release) to home or a nonacute facility with a primary discharge diagnosis of nonspecific headache or back pain (ICD codes)excluded: patients with trauma, those who left the hospital against medical advice, those who were transferred to another acute care facility, those who died at the index ED visit, and out-of-state residents. Similar to previous research on revisits and readmissions, additional ED discharges for headache or back pain within a 30-day period from the index ED visit were not considered, whereas subsequent ED visits occurring after 30 days were counted as an index ED visit if they met the inclusion criteria. Total N: Headache, Back pain: 2101081, 1381614 (Table E1)	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: None Conceptual harms definition: MisDx-Related Harms (DNT, 2009) Harms severity: None Causal taxonomy used: Kachalia 2007

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
				Age: Median, 39,44 Male, n (%): 527051, 592288 (25.2, 43.1) Race, n (%): White, 1015261,724213 (48.3,52.4) Black/African American, 391544,247768 (18.6,17.9)		
Liberman, 2019 ¹⁵⁵	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: West Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2014 to 2015	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: The cohort was subsequently filtered to only include those who had diagnostic images commonly read by emergency physicians and radiology trainees: all plain radiographs, computed tomography studies (CTs) of the brain or abdomen-pelvis, and ultrasounds of the abdomen, pylorus, and pelvis were included. We excluded all other imaging not commonly interpreted by emergency physicians, such as magnetic resonance imaging (MRI) and fluoroscopy. ED point-of-care ultrasounds were similarly excluded. Total N: Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Radiology Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: Unclear or NR Harms severity: Unclear or NR Causal taxonomy used: Unclear or NR
Huang, 2019 ¹⁵⁶	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs	Country: US Region, if US: South Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Unclear or NR	Disease specificity: Single disease Diseases studied: Testicular torsion Other inclusion criteria: Other: Neonatal torsion patients were excluded from this study. Two patients, both of whom were successfully salvaged, did not	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	involved: 1 Annual ED volume: Unclear or NR Ownership: Private, not for profit		Named data source: Dates: 2008 to 2017	receive any ultrasound examinations before surgical intervention and were excluded from the analysis. Total N: 133 Age: Range, 0-20 Male, n (%): 133 (100) Race, n (%): NR	Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Fully-trained emergency clinicians only How left without treatment was handled: Unclear or NR	
Agrawal, 2019 ¹⁵⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2012 to 2015	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients with a catheterization lab alert Total N: 361 Age: Mean, 60 Male, n (%): 221 (61) Race, n (%): Black/African American, 270 (75)	Care delivered entirely within ED: Unclear or NR Consultants involved: Interventional cardiologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Patients were classified as true STEMI alert or as false STEMI alerts after reviewing their peak troponin values, angiography reports, and clinical record. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Kargl, 2019 ¹⁵⁸	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume:	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: None: Total N: 2316 Age: Range, 1-17 Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Pediatric surgeons	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Ownership: Public		Named data source: Dates: 2014 to 2015		Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	
Raposo, 2018 ¹⁵⁹	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Suburban / micropolitan	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2013	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients referred to our TIA clinic Total N: 354 Age: Mean, 61.2 Male, n (%): 178 (50%) Race, n (%): NR	Care delivered entirely within ED: local stroke team Consultants involved: stroke team Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Delay from symptom onset to admission to the TIA clinic Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Yeboah, 2019 ¹⁶⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2012 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Trauma as reason for presentation to the ED; excluded patients with intracranial hemorrhage Total N: 11 Age: Median, 49 Male, n (%): 8 (73%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Diagnosed with stroke on initial presentation to the ED Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Lindsey, 2018 ¹⁶¹	Patient type: General ED	Country: US Region, if applicable (non-US)	Study design: Retrospective cohort	Disease specificity: Single disease	Care delivered entirely within ED: ED	Conceptual diagnostic error definition: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	US: Northeast Urban/rural: Urban / metropolitan	Comparison group: None Look back or look forward analysis: Data source: Radiographs Numerator: Numerator and denominator Named data source: Dates: 2000 to 2016	Diseases studied: Fractures Other inclusion criteria: None: Total N: 135,409 Age: NR Male, n (%): NR Race, n (%): NR	only Consultants involved: Radiologists, orthopedic surgeons Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Venkat, 2018 ¹⁶²	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Australia Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Case-control Comparison group: Matched control group Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2014 to 2016	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients presenting to the hospital ED and admitted to the ward with a final discharge diagnosis of stroke (excluding TIA); also included patients with an alternative non-TIA/stroke ED diagnosis; excluded patients with a non-ischemic or primary hemorrhagic stroke Total N: 312 Age: Median, 77 Male, n (%): 178 (57%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: neurology service Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Missed stroke diagnosis (patients with an alternative non-TIA/stroke ED diagnosis) Conceptual harms definition: discharge modified Rankin Scale and in-hospital mortality Harms severity: modified Rankin Scale Causal taxonomy used: None
Schnapp, 2018 ¹⁶³	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED	Country: US Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Cases were excluded if the patient was under 18 or over the age of 89, the second visit was planned during the first visit (e.g.	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency	Conceptual diagnostic error definition: APSF/Graber 2005 Conceptual harms definition: Dx AEs (Schiff, 2009; Zwaan, 2010) Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Public		health record data Numerator: Numerator and denominator Named data source: Dates: 2013 to 2014	wound check follow-up), the patient was admitted on the first visit or if the patient was discharged on both visits. Total N: 271 Age: NR Male, n (%): NR Race, n (%): NR	physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Pihlasviita, 2018 ¹⁶⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Helsinki Ultra-acute Stroke Biomarker Study Dates: 2013 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: Patients who required primary stroke-code transport to hospital Total N: 1015 Age: Mean, 69 Male, n (%): 568 (56) Race, n (%): NR	Care delivered entirely within ED: CT suite Consultants involved: stroke neurologist or stroke-trained neurology resident Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: The initial diagnosis was incorrect, unclear, or missing Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999	Country: US Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Disease specificity: Multiple diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: None: Total N: 55,233 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved:	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Unclear or NR		Named data source: Dates: 2010 to 2015		Unclear or NR How left without treatment was handled: Unclear or NR	
Sharif, 2018 ¹⁶⁶	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Canada Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2011 to 2015	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Other: Point-of-care ultrasound Total N: 90 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Sederholm Lawesson, 2018 ¹⁶⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 5 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Cross-sectional Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: electronic health records and patient interviews Numerator: Numerator and denominator Named data source: SymTime Dates: 2012 to 2014	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: Patients with a confirmed STEMI diagnosis Total N: 449 Age: Mean, 64.5-69.8 Male, n (%): 340 (76%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Time from first medical contact to diagnostic ECG (first medical contact could be primary healthcare center, Swedish Healthcare Direct, EMS or emergency department) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Liberman, 2018 ¹⁶⁸	Patient type: General ED Patient age: Unclear	Country: US Region, if US: Multiple	Study design: Retrospective cohort Comparison group:	Disease specificity: Single disease Diseases studied: Stroke	Care delivered entirely within ED: Unclear or NR	Conceptual diagnostic error definition: Probable misdiagnosis of cerebral

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	(but not all) Urban/rural: Multiple settings	Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Healthcare Cost and Utilization Project Dates: 2005 to 2013	Other inclusion criteria: Other: All hospitalized adult patients with a first-recorded discharge diagnosis of cerebral venous thrombosis Total N: 5966 Age: Mean, 44.2 Male, n (%): 1690 (28%) Race, n (%): White, 3229 (54%) Black/African American, 945 (16%)	Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	venous thrombosis (an emergency department visit for headache or seizure in the 14 days before CVT hospitalization that did not result in an admission or transfer to another hospital) Conceptual harms definition: rates of intracerebral hemorrhage, in-hospital death, and unfavorable discharge disposition Harms severity: modified Rankin Scale Causal taxonomy used: None
Miller, 2018 ¹²	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 60,000 to 79,999 Ownership: Private, not for profit	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2012 to 2014	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Patients of all ages presenting to the ED complaining of headache who had been sampled for the initial QI effort were eligible for inclusion. Exclusion criteria included patients who arrived after inter-hospital transfer, patients admitted during their index visit, and those with a history of ventriculoperitoneal shunt. Total N: 582 Age: Median, 34 Male, n (%): 215 (36.9) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Chang, 2019 ¹⁶⁹	Patient type: General ED Patient age: Both adults and children Teaching status:	Country: Australia Region, if US: Urban/rural:	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Unclear or NR:	Care delivered entirely within ED: ED and Surgery Consultants involved: Unclear or NR	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: Unclear or NR

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Unclear or NR	method (disease denominator) Data source: Electronic health record data Numerator: Mixed Named data source: Dates: 2013 to 2015	Total N: 208 Age: Mean, 29 Male, n (%): 110 (53%) Race, n (%): NR	Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Harms severity: Unclear or NR Causal taxonomy used: Unclear or NR
Waxman, 2018 ¹⁷⁰	Patient type: General ED Patient age: Unclear or NR Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Unclear or NR	Country: US Region, if US: All US Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Medicare standard analytic files Dates: 2007 to 2014	Disease specificity: Multiple diseases Diseases studied: MULTI-VASCULAR Other inclusion criteria: Process (e.g., left without treatment): All fee-for-service Medicare patients newly diagnosed as having ruptured abdominal aortic aneurysm, acute myocardial infarction, stroke, aortic dissection, or subarachnoid hemorrhage Total N: 1561940 Age: Mean, 77.9 Male, n (%): 716792 (46%) Race, n (%): White, 1278212 (82%) Black/African American, 165287 (11%)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Number of excess ED discharges Conceptual harms definition: Mortality Harms severity: None Causal taxonomy used: None
Scott, 2018 ¹⁷¹	Patient type: General ED Patient age: Children only Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 5 Annual ED volume:	Country: US Region, if US: West Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator	Disease specificity: Single disease Diseases studied: Sepsis Other inclusion criteria: None Total N: 996 for tertiary sites and 98 for community sites Age: Mean, 5.8 for tertiary sites and 4.4 for community sites Male, n (%): 580 for tertiary sites and 53 for community sites (58.2 for tertiary sites and 54.1 for	Care delivered entirely within ED: Unclear or NR Consultants involved: Pharmacist Non-physicians involved: Nurses, respiratory technicians Non-EM physicians involved:	Conceptual diagnostic error definition: Identified and missed patients were identified and included in the registry in 2 ways. 1. Missed patients with sepsis in whom the sepsis pathway was not initiated clinically were identified through standardized chart review conducted by 5

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Multiple Ownership: Unclear or NR		only (error/harm) Named data source: Dates: 2014 to 2015	community sites) Race, n (%): NR	Pediatricians Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	clinicians mont Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Mattsson, 2018 ¹⁷²	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 20,000 to 39,999 Ownership: Public	Country: Western Europe Region, if applicable (non-US): Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Pre/post comparison Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2012 to 2013	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: Multiple: Of these patients, we included all those for whom radiological studies had been ordered. Patients consulting directly with specialist clinics (orthopaedics, neurosurgery, hand surgery, plastic surgery, nephrology and urology) for non-urgent reasons were excluded since the procedures of how and when radiological findings are reported to the requesting physicians differ strongly depending on requesting departments Total N: 1522 Age: Median, 53.74 Male, n (%): 868 (57) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Drapkin, 2020 ¹⁷³	Patient type: Psychiatric ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999	Country: US Region, if applicable (non-US): Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source:	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 1678 Age: Mean, 9.9 Range, 1 to 17 Male, n (%): 923 (55) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Emergency clinicians only Non-physicians involved: Nurses, patient care technicians Non-EM physicians involved: Unclear or NR	Conceptual diagnostic error definition: We defined cases of missed appendicitis as a patient who presented to the pediatric ED within the 7 days preceding their diagnosis of acute appendicitis when the initial visit could plausibly be related to the ultimate diagnosis of appendicitis. Conceptual harms

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Unclear or NR		Intermountain Electronic Data Warehouse Dates: 2009 to 2014		Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	definition: None Harms severity: None Causal taxonomy used: None
Sanders, 2017 ¹⁷⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single health system, multiple EDs Number of EDs involved: 2 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: South Urban/rural: Rural	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: Unclear or NR to Unclear or NR	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Other: patients with signs and symptoms of acute myocardial infarction as main complaint; excluded patients arriving by ambulance Total N: 283 Age: Mean, 61 Range, 26 to 95 Male, n (%): 136 (48.1) Race, n (%): White, 190 (67.1) Black/African American, 88 (31.1)	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: emergency nurses Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Delay (more than 10 minutes from arrival until triage and ECG) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Montmany, 2017 ¹⁷⁵	Patient type: General ED Patient age: Both adults and children Teaching status: Mixed EDs included Hospital setting: Multiple settings Multi-center study Number of EDs involved: 2 Annual ED volume: Multiple Ownership: Multiple	Country: Multiple Region, if US: Northeast Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Trauma database Numerator: Numerator and denominator Named data source: Dates: 2002 to 2016	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: The study analyzes only the patients registered in the database who were deceased, excluding those under the age of 16 (treated by pediatric medical teams at both centers) and those who had died before arrival at the hospital (due to lack of data that would impede the analysis of their quality of care). The inclusion criteria for our study are polytrauma patients who were deceased and had been treated at the American trauma center or the critical care unit at the	Care delivered entirely within ED: ED only Consultants involved: trauma surgery Non-physicians involved: Nurse Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
				Spanish referral hospital. At both hospitals, we have included patients who died before being admitted to the corresponding hospitalization areas Total N: 1524 Age: NR Male, n (%): NR Race, n (%): NR		
Catapano, 2017 ¹⁷⁶	Patient type: orthopaedic care Patient age: Both adults and children Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 20,000 to 39,999 Ownership: Unclear or NR	Country: Western Europe Region, if applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2016 to 2016	Disease specificity: Not restricted by diseases Diseases studied: Other Other inclusion criteria: Other: in absence of attending radiologist Total N: 23,455 Age: Mean, 36.7 Male, n (%): 184 (1%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: radiologist Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Excluded	Conceptual diagnostic error definition: A radiology resident with five years' experience in musculoskeletal radiology reviewed the discrepancy register and divided the cases as follows: (i) false negatives related to missed fractures, including cases wrongly interpreted as negative, those with Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Aaronson, 2018 ¹⁷⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Private, not for profit	Country: US Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Unclear or NR Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Numerator and denominator Named data source: Dates: 2012 to 2015	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 413,167 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Nurses, PAs Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					handled: Unclear or NR	
Mark, 2017 ¹⁷⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single health system, multiple EDs Number of EDs involved: Unclear or NR Annual ED volume: >=80,000 Ownership: Private, not for profit	Country: US Region, if US: West Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator Named data source: Dates: 2007 to 2013	Disease specificity: Single disease Diseases studied: BIG THREE Other inclusion criteria: Multiple: Excluded: Non-traumatic, no SAH presentation at ED, pregnant, no health plan membership, prior SAH Total N: 450 Age: Mean, 59 Male, n (%): 112 (25) Race, n (%): White, 220 (49) Black/African American, 58 (13)	Care delivered entirely within ED: Outpatient, inpatient, telephone Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: modified Rankin Scale (mRS) Causal taxonomy used: None
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Urban/rural Unclear or NR	Study design: Registry Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source: CRICO Dates: 2010 to 2014	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: Other: We excluded claims relating to obstetrics. Total N: 71 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Smidfelt, 2017 ¹⁸⁰	Patient type: General ED Patient age: Unclear or NR	Country: Western Europe Region, if	Study design: Retrospective cohort Comparison group: Concurrent control	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection	Care delivered entirely within ED: ED only Consultants involved:	Conceptual diagnostic error definition: None Conceptual harms definition: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 11 Annual ED volume: Unclear or NR Ownership: Multiple	US: Not applicable (non-US) Urban/rural: Multiple settings	Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Swedvasc Dates: 2008 to 2014	Other inclusion criteria: Process (e.g., left without treatment): only patients treated for the disease Total N: 261 Age: Mean, 75 Male, n (%): 201 (77.0) Race, n (%): NR	Unclear or NR Non-physicians involved: Emergency physicians only Non-EM physicians involved: internal medicine, surgery (general and orthopedic), urology Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Harms severity: None Causal taxonomy used: None
Bartiaux, 2017 ¹⁸¹	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Unclear or NR Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if applicable (non-US): Urban / metropolitan	Study design: Questionnaire Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Questionnaire Numerator: Numerator and denominator Named data source: Dates: 2009 to 2009	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Interhospital transfer for which the patient does not stay in the ED Total N: 332 Age: Range, 15->75 Male, n (%): 196 (59) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: Conceptual harms definition: Harms severity: Causal taxonomy used:
Chompoopong, 2017 ¹⁸²	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs	Country: US Region, if applicable (non-US): Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Other: 82 (3.4%) patients were admitted due to their comorbidities, which were likely not a result of a stroke and were also excluded Total N: 2303	Care delivered entirely within ED: ED only Consultants involved: Neurologists Non-physicians involved: Unclear or NR Non-EM physicians	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR		health record data Numerator: Numerator and denominator Named data source: Dates: 2001 to 2009	Age: NR Male, n (%): NR Race, n (%): NR	involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Podolnick, 2017 ¹⁸³	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Cross-sectional Comparison group: Other (specify) Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator Named data source: EPIC Dates: 2010 to 2015	Disease specificity: Single disease Diseases studied: Not applicable Other inclusion criteria: Multiple: We excluded patients who were transferred less than 12 hours after presentation, patients who died less than 12 hours after presentation, and consultations for contusions, abrasions, sprains not requiring intervention, and superficial lacerations. Total N: 1009 Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Anesthesiologist on-call, Radiology technologist, respiratory care practitioners Non-physicians involved: nurses Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: The rate of missed injury or delayed diagnosis of injury (a DDI) was defined as an injury not detected or suspected on the primary and secondary survey and diagnosed after 12 hours of hospitalization. Conceptual harms definition: A clinically significant injury was defined as an injury that prolonged hospitalization, changed management, or required surgical intervention. Harms severity: None Causal taxonomy used: None
Freedman, 2017 ¹⁷	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Multi-center study Number of EDs involved: 23 Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Abdominal radiograph vs Non abdominal radiograph performed Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: Multiple: Visit represented revisit within 7 days (n = 4984) Transferred (n = 2274) Significant misdiagnosis code assigned at index visit (n = 1367) Unable to track for 7 days pre/post visit (n = 906) Total N: 282 225 Age: Median, Abdominal radiograph performed 7 (3, 11);	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
			and denominator Named data source: Dates: 2004 to 2015	Abdominal radiograph not performed 3 (0, 7) Male, n (%): (Abdominal radiographs performed 48.2 abdominal radiographs not performed 46.8) Race, n (%): (44.6 for abdominal radiograph performed, 30.4 for abdominal radiograph not performed) (24.0 for abdominal radiograph performed, (32.4) for abdominal radiograph not performed)	Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Bayne, 2017 ¹⁸⁴	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Case-control Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Previous study Numerator: Numerator and denominator Named data source: Dates: 2005 to 2015	Disease specificity: Single disease Diseases studied: Testicular torsion Other inclusion criteria: Other: We excluded cases of suspected intermittent torsion and patients under 2 years of age (to omit neonatal torsion and the inability to reliably communicate symptoms) Presentations were considered acute (Total N: 218 Age: Mean, 12.9 for acute, 12.6 for delayed Male, n (%): 218 (100) Race, n (%): (9 for acute, 7 for delayed) (70 for acute, 69 for delayed)	Care delivered entirely within ED: ED only Consultants involved: Urologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Yi, 2017 ¹⁸⁵	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Comparison group: Unclear or NR Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data	Disease specificity: Single disease Diseases studied: BIG THREE Other inclusion criteria: Unclear or NR: Total N: 192 Age: Mean, 67.3 Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: stroke neurologists Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Annual ED volume: Unclear or NR Ownership: Unclear or NR		Numerator: Unclear or NR Named data source: Dates: 2015 to 2016		NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	
Kondis, 2017 ¹⁸⁶	Patient type: pediatric emergency department Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2006 to 2011	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: Multiple: Inclusion criteria included age 0 to 6 months, discharge diagnosis including "fracture," "broken" (or break), or "trauma" or any child abuse diagnosis or chief complaint of "fussy" or "crying" as documented in the electronic medical record by the triage nurse Total N: 18 Age: Male, n (%): (66%) Race, n (%): White, 6 (33) Black/African American, 12 (66)	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Nurses Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Kamal, 2017 ¹⁸⁷	Patient type: neurology Patient age: Adults only Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 1422 Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Registry Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator Named data source: Get With The Guideline Stroke data base Dates: 2012 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Multiple: Total N: 55296 Age: Mean, 71,72,71 Male, n (%): 27825 (50%) Race, n (%): (70.30, 72.93, 68.46) (14.65, 13.99, 16.54)	Care delivered entirely within ED: ED only Consultants involved: neurologist Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Moonen, 2017 ¹⁸⁸	Patient type: General ED Patient age: Both adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: 40,000 to 59,999 Ownership: Public	Country: Western Europe Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2015 to 2015	Disease specificity: Single disease Diseases studied: Fractures Other inclusion criteria: Multiple: Inclusion criteria: all patients of all ages after ambulatory ED admission, attending a subsequent outpatient follow up clinic and with a different diagnosis in comparison to ED diagnosis. Exclusion criteria: non-trauma patients, intra-cranial and thoraco-abdominal trauma of internal organs, patients admitted to hospital, loss to follow up, all knee trauma with planned advanced imaging techniques Total N: 56 Age: Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Radiologist Non-physicians involved: Emergency physicians only Non-EM physicians involved: (surgery, anesthesiology, emergency and internal medicine Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Nevo, 2017 ¹⁸⁹	Patient type: pediatric emergency department in children's hospital Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Other Region, if applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: f patients who underwent orchiectomy and those who underwent orchiopexy Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: Dates: 2008 to 2014	Disease specificity: Single disease Diseases studied: Testicular torsion Other inclusion criteria: None: Total N: 100 Age: Median, 11 Male, n (%): 100 (100) Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Radiologist Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Mouthon-Reignier, 2016 ¹⁹⁰	Patient type: neurology Patient age: Both	Country: Western Europe	Study design: Prospective cohort Comparison group: None	Disease specificity: Single disease Diseases studied: Stroke	Care delivered entirely within ED: neurology stroke unit	Conceptual diagnostic error definition: None Conceptual harms

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	adults and children Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator Named data source: Dates: 2014 to 2014	Other inclusion criteria: Other: all patients admitted in the intensive SU for potential thrombolysis Total N: Age: Male, n (%): Race, n (%):	Consultants involved: neurologist Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	definition: None Harms severity: None Causal taxonomy used: None
Rostanski, 2016 ¹⁹¹	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Cross- sectional Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2011 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Process (e.g., left without treatment): included patients that received thrombolysis Total N: 350 Age: Mean, 67.9 Male, n (%): 132 (37.7) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: neurologist Non-physicians involved: Unclear or NR Non-EM physicians involved: neurologist Trainees involved: Included trainees How left without treatment was handled: Included (broken out)	Conceptual diagnostic error definition: Patients who present with stroke symptoms and are treated with IV tPA but are later found to have a diagnosis other than AIS upon further workup, i.e.. stroke mimics. Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Metts, 2017 ¹⁹²	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR	Country: UK Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: None: Total N: 130 Age: Mean, 65.9 Male, n (%): 61 (47%) Race, n (%): White, 69 (93.2) Black/African American, 4 (5.4)	Care delivered entirely within ED: neurology Consultants involved: Emergency clinicians only Non-physicians involved: neurology Non-EM physicians involved: neurology Trainees involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Ownership: Private, not for profit		Named data source: Dates: 2011 to 2013		How left without treatment was handled: Included (no subgroup analysis)	
Heitmann, 2016 ¹⁹⁴	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: <20,000 Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: 3 cohorts Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2014 to 2014	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 1440 Age: Mean, 60 Male, n (%): 749 (52) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Calic, 2016 ¹⁹⁵	Patient type: General ED Patient age: Adults only Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Prospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2011 to 2015	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: None: Total N: 115 Age: Mean, 66 Male, n (%): 59 (51) Race, n (%): NR	Care delivered entirely within ED: neurology Consultants involved: neurology Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (broken out)	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Normahani, 2017 ¹⁹⁶	Patient type: General ED	Country: UK Region, if	Study design: Retrospective cohort	Disease specificity: Single disease	Care delivered entirely within ED:	Conceptual diagnostic error definition: Unclear or

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Patient age: Adults only Teaching status: Non-academic/Non-teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Unclear or NR Named data source: Dates: 2003 to 2014	Diseases studied: Arterial thromboembolism Other inclusion criteria: None: Total N: 67 Age: Median, 68.4 Male, n (%): 41 (61%) Race, n (%): NR	vascular surgery Consultants involved: vascular surgeon Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	NR Conceptual harms definition: Unclear or NR Harms severity: Unclear or NR Causal taxonomy used: Unclear or NR
Chen, 2016 ¹⁹⁷	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2012 to 2013	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: Other: Appendectomy Total N: 249 Age: Mean, 35.1 Male, n (%): 113 (45.4) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Hansen, 2016 ¹⁹⁸	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: Unclear or	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Unclear or NR Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator only (error/harm)	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Non-specific complaint about nursing management and was excluded Total N: 150 Age: NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: nurse Non-EM physicians involved: Radiology,	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	NR Annual ED volume: Unclear or NR Ownership: Multiple		Named data source: EMER Dates: 2012 to 2015	Male, n (%): 76 (51) Race, n (%): NR	General Surgery Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	
Hillinger, 2017 ¹⁹⁹	Patient type: General ED Patient age: Adults only Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 9 Annual ED volume: Unclear or NR Ownership: Multiple	Country: Multiple Region, if US: Not applicable (non-US) Urban/rural: Multiple settings	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator only (error/harm) Named data source: Dates: 2006 to 2013	Disease specificity: Single disease Diseases studied: Myocardial infarction Other inclusion criteria: Symptom (e.g., dizziness): Total N: 2795 Age: Median, 62 Male, n (%): 1901 (68) Race, n (%): NR	Care delivered entirely within ED: cardiology Consultants involved: Emergency clinicians only Non-physicians involved: Unclear or NR Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Unclear or NR How left without treatment was handled: Excluded	Conceptual diagnostic error definition: Early diagnostic uncertainty in the ED was quantified by assessing clinical judgment of the treating ED physician. Clinical judgment was quantified by a visual analogue scale (VAS) for ACS probability ranging from 0 to 100 %. The treating ED physician Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Madsen, 2016 ²⁰⁰	Patient type: General ED Patient age: Adults only Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs Number of EDs involved: 16 Annual ED volume: Unclear or NR Ownership: Private, not for profit	Country: US Region, if US: Midwest Urban/rural: Multiple settings	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati/Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator Named data source: The Greater Cincinnati /Northern Kentucky	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: None: Total N: 2027 Age: Mean, 69.5, 69.4 Male, n (%): 906 (45) Race, n (%): Black/African American, 436 (22)	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was	Conceptual diagnostic error definition: Missed ED diagnoses were physician- verified strokes that did not receive a diagnosis indicative of stroke in the ED Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
			Stroke Study (GCNKSS) Dates: 2010 to 2010		handled: Included (no subgroup analysis)	
Daverio, 2016 ²⁰¹	Patient type: pediatric Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: 2003 to 2012	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Process (e.g., left without treatment): receiving imaging study Total N: 90 Age: Median, 7.4 Male, n (%): 34 (38%) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: neurology Non-physicians involved: Unclear or NR Non-EM physicians involved: neurology, anesthesiology Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Gaither, 2016 ²⁰²	Patient type: General ED Patient age: Both adults and children Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: Unclear or NR Annual ED volume: Multiple Ownership: Multiple	Country: US Region, if US: Multiple (but not all) Urban/rural: Urban/rural: Multiple settings	Study design: Case series Comparison group: Hospital vs different health system Look back or look forward analysis: Unsure Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source: eLexisNexis Academic legal search database Dates: 1985 to 2015	Disease specificity: Single disease Diseases studied: Testicular torsion Other inclusion criteria: Other: Cases that were for worker's compensation, disability, or against another person or institution other than a hospital were excluded from the analysis Total N: 53 Age: Mean, 15.4 Range, 2 to 47 Male, n (%): 53 (100) Race, n (%): NR	Care delivered entirely within ED: Other location (specify) Consultants involved: Urologist Non-physicians involved: Nurse Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Rosenkrantz, 2016 ²⁰³	Patient type: General ED Patient age: Unclear or NR Teaching status:	Country: US Region, if US: Northeast Urban/rural:	Study design: Comparison group: None Look back or look forward analysis: Look back method (disease	Disease specificity: Multiple Diseases Diseases studied: Not applicable Other inclusion criteria: : Total N:	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Urban / metropolitan	denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Departmental database Dates: 2009 to 2015	Age: Male, n (%): Race, n (%):	only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Causal taxonomy used: None
Aaronson, 2016 ²⁰⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Private, not for profit	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator Named data source: GI ICD-9 Dates: 2013 to 2014	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Other: Subsequently, all patients with one return to the ED during the study period were identified. Patients with two or more visits were not included, because we believe that high utilizers represent a distinct population with unique reasons for return Total N: 10012 Age: Mean, 43.3 Male, n (%): 4683 (46.8) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Arch, 2016 ²⁰⁵	Patient type: general and neurology ED Patient age: Adults only Teaching status: Mixed EDs included Hospital setting: Single health system, multiple EDs	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: None: Total N: 465 Age: Mean, 72 Male, n (%): 212 (46%) Race, n (%): White, 329 (71)	Care delivered entirely within ED: ED only Consultants involved: neurology Non-physicians involved: Unclear or NR Non-EM physicians	Conceptual diagnostic error definition: Missed Opportunity (Singh 2014) Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Number of EDs involved: 2 Annual ED volume: Multiple Ownership: Private, not for profit		health record data Numerator: Numerator and denominator Named data source: NA Dates: 2013 to 2014		involved: neurology Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	
Vagnarelli, 2016 ²⁰⁶	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Single hospital ED Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Registry Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Unclear or NR Named data source: Dates: to	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: Other: must have the diagnosis of Acute Aortic syndrome and a troponin was drawn to be included Total N: Age: Mean, 66.7 Male, n (%): (66.8) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled:	Conceptual diagnostic error definition: Unclear or NR Conceptual harms definition: Unclear or NR Harms severity: Unclear or NR Causal taxonomy used: Unclear or NR
Metcalfe, 2016 ²⁰⁷	Patient type: General ED Patient age: Adults only Teaching status: Mixed EDs included Hospital setting: Multi-center study Number of EDs involved: 9 Annual ED volume: Unclear or NR Ownership: Public	Country: UK Region, if US: Not applicable (non-US) Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: NA Dates: 2011 to 2012	Disease specificity: Single disease Diseases studied: Aortic aneurysm and dissection Other inclusion criteria: None: Total N: 85 Age: Median, 76 Range, 69-97 Male, n (%): 70 (82.4) Race, n (%): NR	Care delivered entirely within ED: vascular center Consultants involved: Emergency clinicians only Non-physicians involved: Emergency physicians only Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: cases that were not initially recognized as ruptured Abdominal Aortic Aneurysm by the first clinician performing a full assessment. Conceptual harms definition: perioperative mortality, in-hospital mortality, 30and 60-day mortality Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
Perry, 2020 ²⁰⁸	Patient type: General ED Patient age: Children only Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: >=80,000 Ownership: Unclear or NR	Country: US Region, if US: Midwest Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator only (error/harm) Named data source: Dates: 2016 to 2019	Disease specificity: Not restricted by diseases Diseases studied: OTHER MULTIPLE Other inclusion criteria: None: Total N: Age: Male, n (%): Race, n (%):	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: IOM/NAM 2015 Conceptual harms definition: Harms severity: Causal taxonomy used:
Copson, 2020 ²⁰⁹	Patient type: Other ED (specify) Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 2 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Australia Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm) Named data source: Dates: Unclear or NR to Unclear or NR	Disease specificity: Single disease Diseases studied: Appendicitis Other inclusion criteria: None: Total N: 26 for specialist obstetric and 19 for general hospital Age: Mean, 31 for specialist obstetric and 29 for general hospital Male, n (%): 0 (0) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Included consultants (specify) Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Lieberman, 2020 ²¹⁰	Patient type: General ED Patient age: Adults only Teaching status: Academic/Teaching Hospital setting:	Country: US Region, if US: Northeast Urban/rural: Urban / metropolitan	Study design: Retrospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look back method (disease	Disease specificity: Single disease Diseases studied: Stroke Other inclusion criteria: Symptom (e.g., dizziness): Total N: 186 Age: Mean, 64	Care delivered entirely within ED: ED only Consultants involved: neurologist Non-physicians involved: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
	Single health system, multiple EDs Number of EDs involved: 4 Annual ED volume: Unclear or NR Ownership: Private, not for profit		denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: EPIC Dates: 2013 to 2018	Male, n (%): 45 (37) Race, n (%): White, 12 (11) Black/African American, 38 (41)	NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Included (no subgroup analysis)	
Gurley, 2018 ²¹¹	Patient type: Unclear or NR Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Unclear or NR Number of EDs involved: Unclear or NR Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: US Region, if US: All US Urban/rural: Unclear or NR	Study design: Case series Comparison group: None Look back or look forward analysis: Not a cohort study Data source: Malpractice claims Numerator: Numerator only (error/harm) Named data source: CRICO Comparative Benchmarking System Dates: 2009 to 2012	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 845 Age: NR Male, n (%): NR Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: NAIC Scale (9-Tier) Causal taxonomy used: Kachalia 2007
Mirete, 2005 ²¹²	Patient type: General ED Patient age: Adults only Teaching status: Non-academic/Non-teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Public	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Suburban / micropolitan	Study design: Cross-sectional Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2004 to 2004	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: None: Total N: 528 Age: Mean, 73 Male, n (%): 313 (59.3) Race, n (%): NR	Care delivered entirely within ED: ED only Consultants involved: Unclear or NR Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

Author, Year	Characteristics of ED	Location	Study Design Characteristics	Patient Characteristics	Study Details	Diagnostic Error Definition/Taxonomy
					handled: Unclear or NR	
Seward, 2003 ²¹³	Patient type: General ED Patient age: Unclear or NR Teaching status: Unclear or NR Hospital setting: Multi-center study Number of EDs involved: 3 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: UK Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Retrospective cohort Comparison group: None Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2000 to Unclear or NR	Disease specificity: Not restricted by diseases Diseases studied: Not applicable Other inclusion criteria: Other: Deaths within 7 days of admission (excluded if died within an hour of arrival) Total N: 200 Age: Median, 79 Male, n (%): 77 (38%) Race, n (%): NR	Care delivered entirely within ED: Unclear or NR Consultants involved: Non-physicians involved: Unclear or NR Non-EM physicians involved: Unclear or NR Trainees involved: Unclear or NR How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None
Geyer, 2013 ²¹⁴	Patient type: General ED Patient age: Unclear or NR Teaching status: Academic/Teaching Hospital setting: Single hospital ED Number of EDs involved: 1 Annual ED volume: Unclear or NR Ownership: Unclear or NR	Country: Western Europe Region, if US: Not applicable (non-US) Urban/rural: Unclear or NR	Study design: Prospective cohort Comparison group: Concurrent control Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator Named data source: Dates: 2003 to 2005	Disease specificity: Single disease Diseases studied: OTHER MULTIPLE Other inclusion criteria: Other: A total of 206 patients were excluded because they did not have a WBCT(n=69) or documentation was incomplete (n =137) Total N: 336 Age: Mean, 42 Male, n (%): 259 (77.1) Race, n (%):	Care delivered entirely within ED: ED only Consultants involved: Radiologists Non-physicians involved: Emergency physicians only Non-EM physicians involved: Emergency medicine trained physicians only Trainees involved: Included trainees How left without treatment was handled: Unclear or NR	Conceptual diagnostic error definition: None Conceptual harms definition: None Harms severity: None Causal taxonomy used: None

AAD: Aortic aneurysm and dissection; APSF: Anesthesia Patient Safety Foundation; Dx: Diagnostic Error; ED: Emergency Department; EM: Emergency Medicine; HCUP: Healthcare Cost and Utilization Project; HDP: Hypertensive disorders of pregnancy; IOM: Institutes of Medicine; ISS: Injury Severity Score; IV-tPA: Intravenous tissue

plasminogen activator; NA: Not Applicable; NAM: National Academies of Medicine; NR: Not reported; pICU: Pediatric Intensive Care Unit; STEMI: ST-elevated myocardial infarction; UK: United Kingdom; US: United States; VTE: Venous thromboembolism

Table D-2. Results of studies that reported on the distribution of diseases with diagnostic errors in the emergency department

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Functional impairment				30				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Urinary tract infection				26				
Peng, 2015 ²⁶	Patient type: General ED Patient age:	Study design: Prospective cohort	Electrolyte disorders				19				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Adults (i.e., >=18 years) Country: Western Europe	Data source: Prospective data collection Numerator: Numerator only (error/harm)									
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Depression/anxiety				17				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Heart failure				14				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Dementia				13				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years)	Study design: Prospective cohort Data source: Prospective data	Malignant neoplasie				14				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Country: Western Europe	collection Numerator: Numerator only (error/harm)									
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Dehydration				8				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Renal failure				20				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Orthostasis				10				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country:	Study design: Prospective cohort Data source: Prospective data collection Numerator:	Intoxication				16				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Western Europe	Numerator only (error/harm)									
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Pneumonia				12				
Peng, 2015 ²⁶	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	N/A	N/A		199				
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: UK	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)				19				
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: UK	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	Neurology/psychiatry				7				
Warrick, 2014 ³¹	Patient type: General ED	Study design: Case series	Cardiology				2				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Patient age: Children (i.e., <18 years) Country: UK	Data source: Electronic health record data Numerator: Numerator only (error/harm)									
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: UK	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	Respiratory				1				
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: UK	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	Gastroenterology				2				
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: UK	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	Musculoskeletal				1				
Warrick, 2014 ³¹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: UK	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	Infection/immunology				6				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	N/A	N/A		20				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	Appendicitis				7				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	intussusception				2				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	bowel obstruction				2				
Freedman, 2014 ³⁷	Patient type: General ED Patient age:	Study design: Retrospective cohort	ovarian torsion				1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Children (i.e., <18 years) Country: Canada	Data source: Electronic health record data Numerator: Numerator only (error/harm)									
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	thalamic brain tumor				1				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	acute lymphoblastic leukemia				1				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	perianal abscess				1				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years)	Study design: Retrospective cohort Data source: Electronic health record data	cardiomyopathy				1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	years) Country: Canada	record data Numerator: Numerator only (error/harm)									
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	bladder rhabdomyosarcoma				1				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	pancreatitis				1				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years) Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	perforated Hartman's pouch				1				
Freedman, 2014 ³⁷	Patient type: General ED Patient age: Children (i.e., <18 years)	Study design: Retrospective cohort Data source: Electronic health record data Numerator:	ileal volvulus				1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Country: Canada	Numerator only (error/harm)									
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Other				1				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Isolated alcohol intoxication				7				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Seizure/post-ictal				1				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Stroke				3				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Isolated other drug intoxication				6				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Traumatic brain injury				3				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Other metabolic derangement				6				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator only (error/harm)	Sepsis				2				
Sporer, 2013 ⁴⁵	Patient type: General ED Patient age:	Study design: Prospective cohort	Combination alcohol/other drug intoxication				10				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Adults (i.e., >=18 years) Country: US	Data source: Prospective data collection Numerator: Numerator only (error/harm)									
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country: Western Europe	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	Missed fractures				16				
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country: Western Europe	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	Delayed diagnoses of fractures				12				
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country: Western Europe	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	Missed luxations				5				
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR	Study design: Case series Data source: Malpractice claims Numerator:	Delayed diagnoses of luxations				1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	NR Country: Western Europe	Numerator only (error/harm)									
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country: Western Europe	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	Missed tendon lesions				5				
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country: Western Europe	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	Missed other diagnoses				8				
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country: Western Europe	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	Other				3				
van Noord, 2010 ⁶¹	Patient type: Unclear or NR Patient age: Unclear or NR Country:	Study design: Case series Data source: Malpractice claims Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	N/A	N/A		50				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Western Europe										
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pregnancy	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pulmonary oedema	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Spinal cord compression	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Strangulated abdominal hernia	N/A	N/A		1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Symptomatic anemia	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Urethral injury	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Urinary retention	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Worsening brain metastasis	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age:	Study design: Case series Data source:	Stroke	N/A	N/A		10				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Unclear or NR Country: US	Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Arrhythmias	N/A	N/A		7				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Arterial thromboembolism	N/A	N/A		5				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Sepsis	N/A	N/A		20				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR	Study design: Case series Data source: Voluntary Medical Error Reporting	Meningitis	N/A	N/A		3				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	NR Country: US	System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pneumonia	N/A	N/A		5				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Appendicitis	N/A	N/A		4				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Fractures	N/A	N/A		18				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator:	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	N/A	N/A	509	209	172	34		

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Acute coronary syndrome	N/A	N/A		19				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Vascular injury	N/A	N/A		18				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Non-septic shock	N/A	N/A		6				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Hypoglycemia	N/A	N/A		6				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Electrolyte derangement	N/A	N/A		5				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pericardial effusion	N/A	N/A		5				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Abscess	N/A	N/A		4				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Bowel injury	N/A	N/A		4				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age:	Study design: Case series Data source:	Gastrointestinal bleeding	N/A	N/A		4				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Unclear or NR Country: US	Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Coagulopathy	N/A	N/A		3				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Haemoperitoneum	N/A	N/A		3				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Intestinal malrotation	N/A	N/A		3				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR	Study design: Case series Data source: Voluntary Medical Error Reporting	Peritonitis	N/A	N/A		3				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	NR Country: US	System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Rh-negative status	N/A	N/A		3				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Small bowel obstruction	N/A	N/A		3				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Cerebral oedema	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator:	Cholecystitis	N/A	N/A		2				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Diabetic ketoacidosis	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Epidural hematoma	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Hypoxia	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Intraocular foreign body	N/A	N/A		2				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Subdural hematoma	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Testicular injury	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Urinary tract infection/pyelonephritis	N/A	N/A		2				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Acute closure glaucoma	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age:	Study design: Case series Data source:	Angioedema	N/A	N/A		1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Unclear or NR Country: US	Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Autonomic dysreflexia	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Cancer	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Cardiac injury	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR	Study design: Case series Data source: Voluntary Medical Error Reporting	Central vertigo	N/A	N/A		1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	NR Country: US	System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Complex migraine	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Cranial nerve palsy	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Hirschsprung enterocolitis	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator:	Hyperglycemia	N/A	N/A		1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Hypokalemic periodic paralysis	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Infected kidney stone	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Intra-abdominal bleeding	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Intracranial shunt malfunction	N/A	N/A		1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Laryngeal mass	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Nephrotic syndrome	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Demyelinating disease	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Neutropenia	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age:	Study design: Case series Data source:	Ovarian torsion	N/A	N/A		1				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Unclear or NR Country: US	Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)									
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pericarditis	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pleural effusion	N/A	N/A		1				
Okafor, 2016 ⁶⁵	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Case series Data source: Voluntary Medical Error Reporting System Numerator: Numerator only (error/harm)	Pulmonary contusion	N/A	N/A		1				
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age	Study design: Case series Data source: Electronic health record data	acute gallbladder pathology				10				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	restricted Country: US	Numerator: Numerator only (error/harm)									
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age restricted Country: US	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	urinary system infections				5				
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age restricted Country: US	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	diverticulitis				2				
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age restricted Country: US	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	small bowel obstruction				2				
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age restricted Country: US	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	Appendicitis				2				
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age:	Study design: Case series Data source:	cancer				2				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Not age restricted Country: US	Electronic health record data Numerator: Numerator only (error/harm)									
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age restricted Country: US	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	ectopic pregnancy				2				
Medford-Davis, 2016 ⁶⁶	Patient type: General ED Patient age: Not age restricted Country: US	Study design: Case series Data source: Electronic health record data Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	621	100		35				
Goulet, 2015 ⁷⁰	Patient type: General ED Patient age: Unclear or NR Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	484	47	24	18	18	18		18
Vanbrabant, 2009 ⁷⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator:	Appendicitis	4860			2				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator and denominator									
Vanbrabant, 2009 ⁷⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	ACS	4860			1				
Vanbrabant, 2009 ⁷⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Pneumonia	4860			1				
Montmany, 2008 ⁵	Patient type: General ED Patient age: Multiple Country: Western Europe	Study design: Prospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Missed Injuries in Polytrauma Patients, Clinically Relevant	75			29				5
Tudela, 2005 ¹⁰⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)									

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Tudela, 2005 ¹⁰⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	669	669	42	42	18			
Gleason, 2020 ¹¹⁵	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Prospective cohort Data source: Prospective data collection Numerator: Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	53			6				
Avelino-Silva, 2020 ¹¹⁷	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Secondary analysis on National Hospital Ambulatory Medical Survey Data source: National Hospital Ambulatory Medical Survey Numerator: Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	5,767			588				
Bourdon, 2020 ¹²³	Patient type: Eye and Ear ED Patient age: Multiple Country: Western Europe	Study design: Prospective cohort Data source: Prospective data collection Numerator:	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	500			32				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator and denominator									
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Fractures				1007				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Other/Diagnosis not specified				679				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Myocardial infarction				161				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System	Stroke				97				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		(NRLS) Numerator: Numerator only (error/harm)									
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Intracranial Bleed				140				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Acute Abdomen				77				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Arterial thromboembolism				34				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR	Study design: Cross-sectional Data source: National	Ectopic pregnancy				31				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	NR Country: UK	Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)									
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Appendicitis				17				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Ischemic Limb				15				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Venous thromboembolism				11				
Hussain, 2019 ¹³⁵	Patient type: NR	Study design: Cross-sectional	Meningitis				11				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Patient age: Unclear or NR Country: UK	Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)									
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	Pneumonia				8				
Hussain, 2019 ¹³⁵	Patient type: NR Patient age: Unclear or NR Country: UK	Study design: Cross-sectional Data source: National Reporting and Learning System (NRLS) Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	N/A	N/A		2288		128		
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Neurologic				9				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Infectious				7				
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Cardiac				4				
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Abdominal				3				
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Withdrawal/intoxication				1				
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age:	Study design: Retrospective cohort	TOTAL ACROSS ALL DISEASES	1,106,606	511	223	31				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Unclear or NR Country: US	Data source: Electronic health record data Numerator: Numerator and denominator	(REPORTED IN STUDY)								
Aaronson, 2020 ¹³⁶	Patient type: General ED Patient age: Unclear or NR Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Other				7				
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Anterior segment		254		76				
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Posterior segment		191		81				
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR	Study design: Retrospective cohort Data source: Electronic health record data	Orbit & ocular adnexa		66		13				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	NR Country: Canada	record data Numerator: Numerator and denominator									
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Neurologic		60		25				
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Uveitis		40		3				
Oliver, 2019 ¹⁴³	Patient type: Eye and Ear ED Patient age: Unclear or NR Country: Canada	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Glaucoma		25		7				
Fernholm, 2019 ¹⁴⁵	Patient type: NR Patient age: Not age restricted Country:	Study design: Retrospective cohort Data source: Malpractice claims Numerator:	Fractures				138				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	Western Europe	Numerator only (error/harm)									
Fernholm, 2019 ¹⁴⁵	Patient type: NR Patient age: Not age restricted Country: Western Europe	Study design: Retrospective cohort Data source: Malpractice claims Numerator: Numerator only (error/harm)	Ruptured tendons				107				
Fernholm, 2019 ¹⁴⁵	Patient type: NR Patient age: Not age restricted Country: Western Europe	Study design: Retrospective cohort Data source: Malpractice claims Numerator: Numerator only (error/harm)	Appendicitis				24				
Fernholm, 2019 ¹⁴⁵	Patient type: NR Patient age: Not age restricted Country: Western Europe	Study design: Retrospective cohort Data source: Malpractice claims Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	N/A	N/A		578			31	45
Fernholm, 2019 ¹⁴⁵	Patient type: NR Patient age: Not age restricted Country: Western Europe	Study design: Retrospective cohort Data source: Malpractice claims Numerator: Numerator only (error/harm)	infection				58				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children	Study design: Retrospective cohort Data source:	Appendicitis	1135	85		7				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	(i.e., <18 years) Country: US	Electronic health record data Numerator: Numerator and denominator									
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Pancreatitis	310	85		16				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Septic shock	225	116		6				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Kawasaki disease	194	66		17				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years)	Study design: Retrospective cohort Data source: Electronic health record data	Septic arthritis	162	39		12				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	years) Country: US	Numerator: Numerator and denominator									
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Ovarian torsion	58	7		3				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Venous thromboembolism	22	13		2				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Stroke	20	16		2				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator:	Hemolytic uremic syndrome	18	4		2				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator and denominator									
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Arterial thromboembolism	7	1		0				
Sundberg, 2018 ¹⁶⁵	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	2151	432		67				
Catapano, 2017 ¹⁷⁶	Patient type: orthopaedic care Patient age: Not age restricted Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	13561			337				
Catapano, 2017 ¹⁷⁶	Patient type: orthopaedic care Patient age: Not age restricted Country: Western Europe	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Fractures				337	147			

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Registry Data source: Malpractice claims Numerator: Numerator only (error/harm)									
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Registry Data source: Malpractice claims Numerator: Numerator only (error/harm)	Fractures	N/A			12				
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Registry Data source: Malpractice claims Numerator: Numerator only (error/harm)	Congenital/development anomalies	N/A			8				
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Registry Data source: Malpractice claims Numerator: Numerator only (error/harm)	Cancer (leukemia, lymphoma, bone, CNS, other)	N/A			7				
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Registry Data source: Malpractice claims Numerator: Numerator only (error/harm)	Other (GI, GU, respiratory, MSK deformity)	N/A			13				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator only (error/harm)									
Breen, 2017 ¹⁷⁹	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Registry Data source: Malpractice claims Numerator: Numerator only (error/harm)	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	n/A			50				
Perry, 2020 ²⁰⁸	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Multiple Numerator: Numerator only (error/harm)	Appendicitis				19				
Perry, 2020 ²⁰⁸	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Multiple Numerator: Numerator only (error/harm)	Fractures				10				
Perry, 2020 ²⁰⁸	Patient type: General ED Patient age: Children (i.e., <18 years) Country: US	Study design: Retrospective cohort Data source: Multiple Numerator: Numerator only (error/harm)	nonaccidental trauma				6				
Perry, 2020 ²⁰⁸	Patient type: General ED Patient age: Children	Study design: Retrospective cohort Data source:	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)		105		105				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
	(i.e., <18 years) Country: US	Multiple Numerator: Numerator only (error/harm)									
Lieberman, 2020 ²¹⁰	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: US	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	Stroke	186		93	93				
Mirete, 2005 ²¹²	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: Western Europe	Study design: Cross-sectional Data source: Electronic health record data Numerator: Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	528			104				6
Seward, 2003 ²¹³	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: UK	Study design: Retrospective cohort Data source: Electronic health record data Numerator: Numerator and denominator	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	200			39				
Seward, 2003 ²¹³	Patient type: General ED Patient age: Adults (i.e., >=18 years) Country: UK	Study design: Retrospective cohort Data source: Electronic health record data Numerator:	TOTAL ACROSS ALL DISEASES (REPORTED IN STUDY)	190			30				

Author, Year	ED Characteristics	Study Design Characteristics	Condition	N (source population)	N (trigger positive)	N (all errors)	N (diagnostic errors)	N (misdiagnosis-related harms)	N (serious misdiagnosis-related harms)	N (permanent injury/disability, not dead)	N (misdiagnosis-related deaths)
		Numerator and denominator									

ACS: Acute coronary syndrome; CI: Confidence Interval; DecrRisk: Decreased Risk; ED: Emergency Department; IncrRisk: Increased Risk; RLQ: Right lower quadrant; SES: Socioeconomic status

Table D-3. Results of studies that reported on the rates of diagnostic errors in the emergency department

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Moy, 2015 ²⁴	Myocardial infarction	Undetermined	111973	111973			110980	993		#Num!							
Leeuwenburgh, 2014 ²⁵	Appendicitis		230	6		10	125	3	102	97.7	91.07	92.59	97.14				
Leeuwenburgh, 2014 ²⁵	Appendicitis		230	6	Simple	25	78	9	118	89.7	82.52	75.73	92.91				
Leeuwenburgh, 2014 ²⁵	Appendicitis		230	6	Perforated	7	15	16	192	48.4	96.48	68.18	92.31				
Leeuwenburgh, 2014 ²⁵	Appendicitis		230	6		7	113	4	99	96.6	93.4	94.17	96.12				
Leeuwenburgh, 2014 ²⁵	Appendicitis		230	6	Simple	19	71	117	16	37.8	45.71	78.89	12.03				
Leeuwenburgh, 2014 ²⁵	Appendicitis		230	6	Perforated	13	17	13	180	56.7	93.26	56.67	93.26				
Leeuwenburgh, 2014 ²⁵	Appendicitis	Total suspected cases	230	6	128/230	10	118					92.19					
Dubosh, 2015 ¹¹	Serious neurologic disorder or in-hospital death with misdiagnosis of headache		14300000	14300000				10374	2090707				99.5				
Dubosh, 2015 ¹¹	Serious neurologic disorder or in-hospital death with misdiagnosis of back pain		14300000	14300000				2,850	1378764				99.8				
Wilson, 2014 ²⁸	Myocardial infarction	Undetermined	371638	371638			366864	4774		#Num!							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Graff, 2014 ²⁹	Myocardial infarction	Undetermined	29578	29578			6291	181		97.2							
Pirozzi, 2014 ¹⁹	AHF (After POC-US) (G2)		168	168						100	98.4						
Pirozzi, 2014 ¹⁹	Pneumonia	After POC-US (G1+G2)	168	168						92	98						
Pirozzi, 2014 ¹⁹			168	168													
Pirozzi, 2014 ¹⁹	AHF (Standard protocol (G2))		168	168						78.2	67.7						
Pirozzi, 2014 ¹⁹	Acute heart failure (After POC-US (G1+G2))		168	168						100	99						
Pirozzi, 2014 ¹⁹	Pneumonia	After POC-US G2	168	168						93.3	98.5						
Pirozzi, 2014 ¹⁹	Arterial thromboembolism	VTE - Pulmonary embolism	168	168						89	100						
Pirozzi, 2014 ¹⁹	Pneumonia	Standard protocol (G2 prior to POC-US)	168	168						14.2	97.1						
Pirozzi, 2014 ¹⁹	Arterial thromboembolism	VTE - Pulmonary embolism	168	168						0	98.8						
Pirozzi, 2014 ¹⁹	Arterial thromboembolism	VTE - Pulmonary embolism	168	168						83.3	100						
Pirozzi, 2014 ¹⁹	Undifferentiated Dyspnea		168	168												0.95	
Palomeras Soler, 2015 ³²	Stroke	Stroke - Transient ischemic attack	411	411			337	74		82							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Palomeras Soler, 2015 ³²	Stroke	Stroke - Transient ischemic attack	411	411			386	25		93.9							
Newman-Toker, 2014 ³³	Stroke	Undetermined	187188	187188			26005	2243		92.1							
Newman-Toker, 2014 ³³	Stroke	Undetermined	187188	187188				11									
Vioque, 2014 ³⁵			11100	11100													
Vioque, 2014 ³⁵	Preventable/Possibly Preventable Trauma Death		11100	11100													
Grosmaître, 2013 ³⁶	Myocardial infarction	Undetermined	255	255			189	66		74.1							
Grosmaître, 2013 ³⁶	Myocardial infarction	Undetermined	255	255			149	106		58.4							
Torres-Macho, 2013 ³⁸	Venous thromboembolism	VTE - Pulmonary embolism	436	436			290	146		66.5							
Kornblith, 2013 ⁷			201	201													
Kornblith, 2013 ⁷	Accuracy across all diseases if more than one category		201	201			31	10		75.6							
Kornblith, 2013 ⁷	Accuracy across all diseases if more than one category		201	201			136	24		85							
Mohamed, 2013 ⁴²	Stroke	Undetermined	93	93			60	13		82.2							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Guillan, 2012 ⁴³	Stroke	Undetermined	621			15	606					97.58					
Caterino, 2012 ²¹	Acute Urinary Tract Infection		103	275		4	14	10	75	58	95	78	88	11.52	0.44		
Caterino, 2012 ²¹	Osteomyelitis		103	275		2	1	2	98	33	98	33	98	16.67	0.68		
Caterino, 2012 ²¹	Sepsis	Acute Bloodstream Infection/Bacteremia	103	275		16	6	9	69	40	78	24	88	1.85	0.76		
Caterino, 2012 ²¹	Acute Pulmonary Infection (Pneumonia/Emphysema)		103	275		17	38	4	44	90	72	69	92	3.24	0.13		
Caterino, 2012 ²¹	Acute Skin and Soft Tissue Infection		103	275		3	11	3	86	79	96	79	97	23.31	0.22		
Caterino, 2012 ²¹	Acute GI Infection (Including appendicitis)		103	275		3	4	4	92	50	97	57	96	15.83	0.52		
Caterino, 2012 ²¹	Acute Central Nervous System Infection (Including Meningitis, Epidural Abscess)		103	275		0	1	0	102	100	100	1	1		0		
Lever, 2013 ⁴⁴	Stroke	Undetermined	189	189			160	29		84.7							
Snoek, 2013 ²			822	475													
Snoek, 2013 ²	Delayed diagnostic injuries		822	475			462	13		97.3							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
	(including fractures, myocardial contusion, pneumothorax, intercrebral bleeding, renal contusion)																
Crosby, 2013 ¹⁶			2415	2415													
Crosby, 2013 ¹⁶	Accuracy across all diseases if more than one category		2415	2415			2402	13		99.5							
Muhm, 2012 ³	Accuracy across all diseases if more than one category		111	111			462	56		89							
Muhm, 2012 ³	Accuracy across all diseases if more than one category		111	111			86	25		77.5							
Scheuermeyer, 2012 ⁴⁶	Myocardial infarction	Undetermined	1116	1116			120	0		100							
Hochberg, 2011 ⁴⁷	Stroke	Stroke - Subarachnoid hemorrhage	83	83		1	46	7	29	.87	.97	.98	.81				
Martin, 2011 ⁴⁸	Stroke	Undetermined	91				32	59		35.2							
Postma, 2012 ⁴	Delayed diagnosis of injury after plane crash		126	66			58	8		88							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Royle, 2011 ⁹	Dizziness		475	475			69										
Smith, 2012 ⁵⁰	Venous thromboembolism	VTE - Pulmonary embolism	400	400			327	73		81.8							
Miedema, 2011 ⁵¹	Myocardial infarction	Undetermined	2028	2028			1378	650		67.9							
Miedema, 2011 ⁵¹	Myocardial infarction	Undetermined	2028	2028			2004	24		98.8							
Miedema, 2011 ⁵¹	Myocardial infarction	Undetermined	2028	2028			1980	48		97.6							
Schrock, 2012 ⁵³	Stroke	Stroke - Transient ischemic attack	429	429		156	273					63.64				64	36
Tsivgoulis, 2011 ⁵⁵	Stroke	Stroke - Ischemic stroke	539	539		56	483					89.61					
Willner, 2012 ⁶	Delayed Diagnosis of Injury After Pediatric Trauma		324	324			298	26		92							
Calder, 2010 ⁵⁸	Accuracy across all diseases if more than one category		518	418			493	10		98							
Sevdalis, 2010 ⁵⁹	Accuracy across all diseases if more than one category		136	136				208									
Kuruville, 2011 ⁶⁰	Stroke	Stroke - Ischemic stroke	57	57			49	8		86							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Pare, 2016 ⁶²	Aortic aneurysm and dissection	Undetermined	32	32			16	0		100							
Pare, 2016 ⁶²	Aortic aneurysm and dissection	Undetermined	32	32			9	7		56.2							
Ferree, 2016 ¹	Delayed identification of physical injuries (including fractures, ligament/tendon injuries, external wounds, burns, bowel perforation, hemothorax)		1416	1416				170									
Ferree, 2016 ¹	Fractures	Hand	1416	1416			33	39		46							
Ferree, 2016 ¹	Fractures	Foot	1416	1416			38	23		62							
Ferree, 2016 ¹	Fractures	Tibia	1416	1416			42	11		79							
Ferree, 2016 ¹	Fractures	Fibula	1416	1416			18	4		82							
Ferree, 2016 ¹	Fractures	Ankle	1416	1416			40	7		85							
Ferree, 2016 ¹	Fractures	Humerus	1416	1416			75	13		85							
Ferree, 2016 ¹	Fractures	Radius	1416	1416			98	11		90							
Ferree, 2016 ¹	Fractures	Knee	1416	1416			24	2		92							

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Ferree, 2016 ¹	Fractures	Ulna	1416	1416			88	8		92							
Ferree, 2016 ¹	Fractures	Clavicle	1416	1416			184	12		94							
Ferree, 2016 ¹	Fractures	Scapula	1416	1416			122	5		96							
Ferree, 2016 ¹	Fractures	Femur	1416	1416			131	3		98							
Ferree, 2016 ¹	Fractures	Cruris	1416	1416			84	2		98							
Vinz, 2015 ⁶⁴	Accuracy across all diseases if more than one category		271	271	271/271	95	176					64.94					
Carlton, 2015 ⁶⁹	Myocardial infarction	Undetermined	912	912		336	58	56	462	50.9	57.89	14.72	89.19				
Goulet, 2015 ⁷⁰			1,134,032	555													
Goulet, 2015 ⁷⁰	Accuracy across all diseases if more than one category		1,134,032	555													
Groot, 2016 ⁷¹	Myocardial infarction	STEMI	827			68	759					91.78					
Holland, 2015 ⁷²	Stroke	Stroke - Intracerebral hemorrhage	984			22	291					92.97					
Holland, 2015 ⁷²	Stroke	Stroke - Subarachnoid hemorrhage	984			37	270					87.95					
Weinberg, 2010 ⁷⁴	Fractures	Mandible	348	348	27					67	100					33	

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Weinberg, 2010 ⁷⁴	Fractures	Clavicle	348	348	60					89	83			5.3	.13		
Weinberg, 2010 ⁷⁴	Fractures	Proximal humerus	348	348	13					100	100				0		
Weinberg, 2010 ⁷⁴	Fractures	Ulna	348	348	27					50	95			11	.52		
Weinberg, 2010 ⁷⁴	Fractures	Metacarpal	348	348	16					80	85			5.4	.23		
Weinberg, 2010 ⁷⁴	Fractures	Phalange	348	348	22					50	97	14.5	.51				
Weinberg, 2010 ⁷⁴	Fractures	Patella	348	348	0						100						
Weinberg, 2010 ⁷⁴	Fractures	Tibia	348	348	18					83	93			11.7	.18		
Weinberg, 2010 ⁷⁴	Fractures	Fibula	348	348	15					67	97			22.7	.34		
Weinberg, 2010 ⁷⁴	Fractures	Metacarsal	348	348	18					100	93	14	0				
Weinberg, 2010 ⁷⁴	Fractures	Elbow	348	348	50					80	87			6	.23		
Weinberg, 2010 ⁷⁴	Fractures	Skull	348	348	10					100	100				0		
Vanbrabant, 2009 ⁷⁵	Accuracy across all diseases if more than one category		141	141			121	20		85.8	85.8						
Ravichandiran, 2010 ⁷⁶	Fractures	NA (all fractures)	258	258			204	54		79.1							
Santos, 2009 ⁷⁷	Appendicitis	Undetermined	100	100	70/100	4	66					94.3					
Santos, 2009 ⁷⁷	Appendicitis	Undetermined	100	100	40/44	3	37					92.5					
Santos, 2009 ⁷⁷	Appendicitis	Undetermined	100	100	30/56	1	29					96.6					

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Hoekstra, 2009 ⁷⁸	Myocardial infarction	STEMI	1830	1830			91	25	1714	78.4			98.56				
Rizos, 2009 ⁷⁹	Stroke	Undetermined	1735	1735		86	121	11	213	91.7	71.24	58.45	95.09				
Rizos, 2009 ⁷⁹	Stroke	Undetermined	1735	1735		104	105	3	175	97.2	62.72	50.24	98.31				
Rizos, 2009 ⁷⁹	Stroke	Undetermined	1735	1735		104	140	5	150	96.6	59.06	57.38	96.77				
Williams, 2009 ⁸¹	Fractures	NA (all fractures)	1100	1100			1056	44		96							
Chung, 2009 ²²			4768	4768													
Chung, 2009 ²²	Radiologist Resident Misread of Torso CT Relative to Attending Radiologists (gold standard)		4768	4768													2%
Gaughan, 2009 ⁸²	Aortic aneurysm and dissection	AAD - Abdominal aortic aneurysm	98	98			54	44		55.1							
Winkler, 2009 ⁸⁴	Stroke	Stroke - Ischemic stroke	250	250		7	243					97.2					
Kline, 2009 ²⁰	ACS		1013	400	185 (CONTROL)		184	1		99.5							
Kline, 2009 ²⁰	ACS		1013	400	184 (INTERVENTION group)	0	184					100					
Filippi, 2008 ²³	Accuracy across all		361	361		3	170	23	165	88	98.2	98.3	87.8				

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	diseases if more than one category																
Rapezzi, 2008 ⁸⁵	Aortic aneurysm and dissection	Undetermined	161	161			121	40		75.2							
Rapezzi, 2008 ⁸⁵	Aortic aneurysm and dissection	AAD - Stanford Group A dissection (Debaque type I and II)	161	161			86	29		74.8							
Prabhakaran, 2008 ⁸⁶	Stroke	Stroke - Transient ischemic attack	100	100		60	40					40					
Moeller, 2008 ¹⁰			493	493													
Moeller, 2008 ¹⁰			493	493													
Moeller, 2008 ¹⁰	Disagreement in Diagnosis between ED Attending/Trainees and Neurology Consult		493	493													36
Rose, 2008 ⁸⁷	Stroke	Undetermined	15117	15117			1738	13379		11.5							
Montmany, 2008 ⁵	Missed Injuries in Polytrauma Patients, Clinically Significant		122	122				21									
Montmany, 2008 ⁵	Missed injury						101	21		82.8							

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Kim, 2007 ⁹⁰	Pneumonia	Round pneumonia	112	112		3	109					97.32					
Kline, 2007 ⁹²	Venous thromboembolism	VTE - Pulmonary embolism	200	161			141	20		87.6							
Sun, 2007 ⁸	Diagnostic delay after treat-and-release ED visit for syncope/near syncope						445	18		96.1							
Jiménez Castro, 2007 ⁹³	Venous thromboembolism	VTE - Pulmonary embolism	397	397			325	72		81.9							
Jiménez Castro, 2007 ⁹³	Venous thromboembolism	VTE - Pulmonary embolism	397	397				9									
Hansen, 2007 ⁹⁴	Aortic aneurysm and dissection	Undetermined	66	66			40	26		60.6							
Vermeulen, 2007 ⁹⁵	Stroke	Stroke - Subarachnoid hemorrhage	1603	1507			1426	81		94.6							
Schull, 2006 ⁹⁷	Myocardial infarction	Undetermined	19663	19663			19244	419		97.9							
Pehle, 2006 ⁹⁸	Fractures	NA (all fractures)	1187	1187				58									
Gallagher, 2006 ¹³	Acute Abdominal Pain		153	1						0.97	0.3						
Gallagher, 2006 ¹³	Acute Abdominal Pain		153	1						0.98	0.46						

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Graff, 2006 ⁹⁹	Myocardial infarction	Undetermined	7888	7888			5861	2027		74.3							
Ray, 2006 ¹⁸	CPE, cardiogenic pulmonary edema		514	514						.71	.80	.74	.78				
Ray, 2006 ¹⁸	Pneumonia	Community-acquired pneumonia	514	514						.86	.76	.66	.91				
Ray, 2006 ¹⁸	Acute exacerbation of CRD chronic respiratory disease		514	514						.71	.83			.66	.86		
Ray, 2006 ¹⁸	Pulmonary embolism		514	514						.75	.78	.43	.93				
Ray, 2006 ¹⁸	Asthma		514	514						.67	.97	.42	.99				
Nuñez, 2006 ¹⁰¹	Unscheduled returns		500	500			230	20		.92							
Nuñez, 2006 ¹⁰¹	Non-returns		500	500			246	4		.98.4							
Hallas, 2006 ¹⁰²			5879	1323													
Hallas, 2006 ¹⁰²	Fractures	NA (all fractures)	5879	1323		21		40									
Hallas, 2006 ¹⁰²	Fractures	Ankle	5879	1323				11									
Hallas, 2006 ¹⁰²	Fractures	Lower arm	5879	1323				9									
Hallas, 2006 ¹⁰²	Fractures	Hand	5879	1323				4									
Hallas, 2006 ¹⁰²	Fractures	Hip	5879	1323				4									
Gouin, 2006 ¹⁰³	Posttime period PCAS		3074	3074						96.4	98.9	97.7	98.3				

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Gouin, 2006 ¹⁰³	Pretime period PCAS		3074	3074						98.1	96.6	99.2	99.2				
Tudela, 2005 ¹⁰⁵	Accuracy across all diseases if more than one category		669	669		0	627	42	0	93.7	#Num!	100	0				
Rønning, 2005 ¹⁰⁶			354														
Rønning, 2005 ¹⁰⁶	Stroke	Undetermined	354			88	266					75.14					
Beaver, 2005 ¹⁰⁷	Aortic aneurysm and dissection	Undetermined	100	100												76	24
Beaver, 2005 ¹⁰⁷	Aortic aneurysm and dissection	aortic aneurysm	100	100		7		7									
Beaver, 2005 ¹⁰⁷	Aortic aneurysm and dissection	aortic dissection	100	100		14		6									
Garfield, 2004 ¹⁰⁸	Appendicitis	Undetermined	124	124	42/42	2	40					95					
Garfield, 2004 ¹⁰⁸	Appendicitis	Undetermined	124	124	67/67	4	63					94					
Garfield, 2004 ¹⁰⁸	Appendicitis	Undetermined	124	124	8/8	1	7					87.5					
Garfield, 2004 ¹⁰⁸	Appendicitis	Undetermined	124	124	8/8	1	7					87.5					
Garfield, 2004 ¹⁰⁸	Appendicitis	Undetermined	124	124	124/124	8	116					93.5					
Soundappan, 2004 ¹⁰⁹	Fractures	Spine	76	76				2									
Soundappan, 2004 ¹⁰⁹	Accuracy across all diseases if		76	76			65	12		84.4							

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	more than one category																
Soundappan, 2004 ¹⁰⁹	Fractures	Head and face	76	76				2									
Soundappan, 2004 ¹⁰⁹	Fractures	Upper limb	76	76				2									
Soundappan, 2004 ¹⁰⁹	Fractures	Lower limb	76	76				2									
Heckmann, 2004 ¹¹⁰	Stroke	Undetermined	462	138		29	109					78.99					
Corral Gudino, 2003 ¹¹¹	pulmonary embolism		58	58			43	15		74.1							
Conti, 2003 ¹¹²	Myocardial infarction	perfusion defects	306	306		60	45	3	198	93.8	76.74	42.86	98.51				
Conti, 2003 ¹¹²	Myocardial infarction	Wall motion abnormalities	306	306		42	45	4	216	91.8	83.72	51.72	98.18				
Harbison, 2003 ¹¹³	Stroke	Undetermined	487	93		27	66					70.97					
Liberman, 2020 ¹¹⁴	Stroke	Stroke - Ischemic stroke	28,121	28,121				90	28,030				99.68				
Liberman, 2020 ¹¹⁴	Stroke	Any cerebrovascular event	28,121	28,121				111	28010				99.61				
Gleason, 2020 ¹¹⁵	Accuracy across all diseases if more than one category		59	59			47	6		88.7							
Sharp, 2020 ¹²⁰	Myocardial infarction	Undetermined	44473	44473			43899	574		#Num!							
Sharp, 2020 ¹²⁰	Myocardial infarction	Undetermined	44473	44473				508	324580				#Num!				

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Mansella, 2020 ¹²¹	Venous thromboembolism	VTE - Pulmonary embolism	2058	2058				19									
Mansella, 2020 ¹²¹	Venous thromboembolism	VTE - Pulmonary embolism	2058	2058			182	44	1832	80.5			97.65				
Smidfelt, 2020 ¹²²	Aortic aneurysm and dissection	AAD - Abdominal aortic aneurysm	455	455			278	177		61.1							
Saaristo, 2020 ¹⁵	Non-specific abdominal pain (revisit to ED w/in 48 hours of discharge)		173,630	173,630			210	78		72.9							
Chan, 2020 ¹²⁵	Venous thromboembolism	VTE - Pulmonary embolism	302	123			230	72		76.2							
Mattijssen-Horstink, 2020 ¹²⁶	Fractures	NA (all fractures)	26246	26246			25957	289		98.9							
Liberman, 2020 ¹²⁷	Stroke	cervicocephalic artery dissection	7090	7090			6872	218		96.9							
Zaschke, 2020 ¹²⁸	Aortic aneurysm and dissection	AAD - Stanford Group A dissection (Debaquey type I and II)	350	350			76	274		21.7							
Comolli, 2020 ¹²⁹	Stroke	ischemic stroke or TIA	286	286				9									
Osterwalder, 2020 ¹⁴	Appendicitis	Undetermined	480	480			1	1		50							
Osterwalder, 2020 ¹⁴	Cholelithiasis		480	480			6	2		75							

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Osterwalder, 2020 ¹⁴	Gastroenteritis		480	480			2	5		28.6							
Osterwalder, 2020 ¹⁴	Urinary retention		480	480			4	0		100							
Osterwalder, 2020 ¹⁴	Constipation		480	480			1	1		50							
Osterwalder, 2020 ¹⁴	Disorders of ovary		480	480			1	1		50							
Osterwalder, 2020 ¹⁴	Diverticulitis		480	480			2	0		100							
Osterwalder, 2020 ¹⁴	Endometriosis		480	480			2	0		100							
Osterwalder, 2020 ¹⁴	Food intolerance		480	480			0	2		0							
Osterwalder, 2020 ¹⁴	Malignant diseases		480	480			0	2		0							
Osterwalder, 2020 ¹⁴	Pyelonephritis		480	480			2	0		100							
Osterwalder, 2020 ¹⁴	Urolithiasis		480	480			1	1		50							
Osterwalder, 2020 ¹⁴	Others		480	480			13	10		56.5							
Osterwalder, 2020 ¹⁴	NSAP		480	480			2	1		66.7							
Osterwalder, 2020 ¹⁴	Abdominal pain		480	480			453	27		94.4							
Fasen, 2020 ¹³¹	Stroke	large vessel occlusion in acute anterior circulation ischemic stroke	520	520			67	17		79.8							
Mahajan, 2020 ¹³⁴	Preeclampsia/eclampsia	Hypertensive disorders of pregnancy	111	111			28										

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Michelson, 2019 ¹³⁷	Sepsis	Undetermined	5457	5457	23%	2	5	13	59	27.8	96.72	71.4	81.94				
Michelson, 2019 ¹³⁷	Sepsis	Undetermined	5457	5457	23%	4	7	11	57	38.9	93.44	63.6	83.82				
Michelson, 2019 ¹³⁷	Sepsis	Undetermined	5457	5457	23%	10	7	11	51	38.9	83.61	41.2	82.26				
Michelson, 2019 ¹³⁷	Appendicitis	Undetermined	5457	5457	73%	1	25	33	20	43.1	95.24	96.2	37.74				
Michelson, 2019 ¹³⁷	Appendicitis	Undetermined	5457	5457	73%	2	39	19	19	67.2	90.48	95.1	50				
Michelson, 2019 ¹³⁷	Appendicitis	Undetermined	5457	5457	73%	3	44	14	18	75.9	85.71	93.6	56.25				
Ois, 2019 ¹³⁸	Stroke	Stroke - Subarachnoid hemorrhage	400	400			296	104		74							
Czolgosz, 2019 ¹⁴²	Accuracy across all diseases if more than one category		164	164			160	4		97.6							
Liberman, 2019 ¹⁴⁴	Stroke	cerebral venous thrombosis	53	53			42	11		79.2							
Liberman, 2019 ¹⁴⁴	Stroke	Cerebral Venous Thrombosis	53	53			52	1		98.1							
Sadighi, 2019 ¹⁴⁷	Stroke	Stroke - Transient ischemic attack	254	254		190	64					25.2					
Hautz, 2019 ¹⁴⁸	Accuracy across all diseases if more than one category		14187	755				68								87.8%	12.2%

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Degheim, 2019 ¹⁴⁹			347	347													
Degheim, 2019 ¹⁴⁹	Myocardial infarction	STEMI	347	347		37	328	2	8	99.4	17.78	89.86	80				
Chan, 2019 ¹⁵⁰	Testicular torsion	Absent or diminished flow	46	46		1	41	3	1	93.02	50	95.24	40				
Chan, 2019 ¹⁵⁰	Testicular torsion	Absence of arterial waveform	46	46			26	18		58.33		100	0				
Chan, 2019 ¹⁵⁰	Testicular torsion	Heterogeneous echotexture	46	46		1	15	29	1	35.48	66.67	91.67	9.09				
Chan, 2019 ¹⁵⁰	Testicular torsion	Absence of doppler flow	46	46		1	29	15	1	65.12	75	96.55	16.67				
Ohle, 2019 ¹⁵¹	Aortic aneurysm and dissection	acute aortic dissection	194	194			160	34		82.5							
Williams, 2019 ¹⁵²			1392	1392													
Williams, 2019 ¹⁵²	Myocardial infarction	STEMI	1392	1392			1368	24		98.3							
Williams, 2019 ¹⁵²	Myocardial infarction	STEMI	1392	1392			1292	100		92.8							
Gergenti, 2019 ¹⁵³	Accuracy across all diseases if more than one category		172907	172907				174									
Gergenti, 2019 ¹⁵³	Fractures	NA (all fractures)	172907	172907				19									
Gergenti, 2019 ¹⁵³	Fractures	Face	172907	172907				4									
Gergenti, 2019 ¹⁵³	Fractures	Leg	172907	172907				3									

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Gergenti, 2019 ¹⁵³	Fractures	Hand	172907	172907				2									
Gergenti, 2019 ¹⁵³	Fractures	Foot	172907	172907				2									
Gergenti, 2019 ¹⁵³	Fractures	Rib	172907	172907				1									
Gergenti, 2019 ¹⁵³	Fractures	Pelvis	172907	172907													
Gergenti, 2019 ¹⁵³	Fractures	Scapula	172907	172907				1									
Gergenti, 2019 ¹⁵³	Fractures	Vertebrae	172907	172907				1									
Dubosh, 2019 ¹⁵⁴			3482695	3482695													
Dubosh, 2019 ¹⁵⁴	Neurologic events with headache diagnosis		3482695	3482695				10374									
Dubosh, 2019 ¹⁵⁴	Neurologic events with back pain diagnosis		3482695	3482695				2850									
Liberman, 2019 ¹⁵⁵	Accuracy across all diseases if more than one category		8310	8310			8103									97.5%	2.5%
Agrawal, 2019 ¹⁵⁷	Myocardial infarction	STEMI	361	361		82	279					77.29					
Kargl, 2019 ¹⁵⁸	Fractures	NA (all fractures)	2,316	2,316		63		62									
Kargl, 2019 ¹⁵⁸	Fractures	Elbow	2,316	2,316			146	20		88							
Kargl, 2019 ¹⁵⁸	Fractures	Wrist	2,316	2,316			277	25		91.7							

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Kargl, 2019 ¹⁵⁸	Fractures	Fingers	2,316	2,316			727	35		95.4							
Kargl, 2019 ¹⁵⁸	Fractures	Metacarpus	2,316	2,316			136	6		95.8							
Kargl, 2019 ¹⁵⁸	Fractures	Toes	2,316	2,316			220	8		96.5							
Kargl, 2019 ¹⁵⁸	Fractures	Knee	2,316	2,316			192	4		98							
Kargl, 2019 ¹⁵⁸	Fractures	Midfoot	2,316	2,316			310	6		98.1							
Kargl, 2019 ¹⁵⁸	Fractures	Ankle	2,316	2,316			322	6		98.2							
Kargl, 2019 ¹⁵⁸	Fractures	Skull	2,316	2,316			1884	4		99.8							
Raposo, 2018 ¹⁵⁹	Stroke	Stroke - Transient ischemic attack	354	169			128	41		75.7							
Yeboah, 2019 ¹⁶⁰	Stroke	Undetermined	11	11			0	11		0							
Lindsey, 2018 ¹⁶¹	Fractures	Aided	135,409	135,409						91.5	93.9						
Lindsey, 2018 ¹⁶¹	Fractures	Unaided	135,409	135,409						81.8	87.5						
Venkat, 2018 ¹⁶²	Stroke	Undetermined	1514	1514		485	779					61.63					
Venkat, 2018 ¹⁶²	Stroke	Undetermined	1514	1514			1358	156		89.7							
Schnapp, 2018 ¹⁶³			271	271													
Schnapp, 2018 ¹⁶³	Accuracy across all diseases if more than one category		271	271			219	52		80.8							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Pihlasviita, 2018 ¹⁶⁴	Stroke	Undetermined	1015	1015		150	865					85.22					
Sharif, 2018 ¹⁶⁶	Appendicitis		90	1	24/90	6	18	8	58	0.692	0.906	7.4	0.3				
Sederholm Lawesson, 2018 ¹⁶⁷	Myocardial infarction	STEMI	437	437			350	87		80.1							
Sederholm Lawesson, 2018 ¹⁶⁷	Myocardial infarction	STEMI	437	437			299	142		67.8							
Liberman, 2018 ¹⁶⁸	Stroke	cerebral venous thrombosis	5966	5966			5750	216		96.4							
Liberman, 2018 ¹⁶⁸	Stroke	cerebral venous thrombosis	5966	5966			126	8		94							
Miller, 2018 ¹²	Accuracy across all diseases if more than one category		582	582				10									
Waxman, 2018 ¹⁷⁰	Aortic aneurysm and dissection	Ruptured abdominal aortic aneurysm	1561940	1561940			17352	611		96.6							
Waxman, 2018 ¹⁷⁰	Myocardial infarction	Undetermined	1561940	1561940			297965	7015		#Num!							
Waxman, 2018 ¹⁷⁰	Aortic aneurysm and dissection	Aortic dissection	1561940	1561940			18790	885		95.5							
Waxman, 2018 ¹⁷⁰	Stroke	Stroke - Subarachnoid hemorrhage	1561940	1561940			36355	1319		#Num!							
Waxman, 2018 ¹⁷⁰	Stroke	Undetermined	1561940	1561940			113320	48448		#Num!							

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Mattsson, 2018 ¹⁷²	Fractures	Hand	1522	1522				12									
Mattsson, 2018 ¹⁷²	Fractures	Thorax	1522	1522				74									
Mattsson, 2018 ¹⁷²	Fractures	Pelvis	1522	1522				14									
Mattsson, 2018 ¹⁷²	Fractures	Knee	1522	1522				56									
Mattsson, 2018 ¹⁷²	Fractures	Ankle	1522	1522				10									
Mattsson, 2018 ¹⁷²	Fractures		1522	1522				381									
Montmany, 2017 ¹⁷⁵	Spain Trauma center		1521	1521				6									
Montmany, 2017 ¹⁷⁵	US trauma center		1521	1521				28									
Catapano, 2017 ¹⁷⁶	Fractures	NA (all fractures)	13561	13561		44		293								13224/13561	337/13561
Aaronson, 2018 ¹⁷⁷	Accuracy across all diseases if more than one category		413,167	413,167			413177	60		#Num!							
Mark, 2017 ¹⁷⁸	aneurysmal subarachnoid hemorrhage						404	46		89.8							10
Breen, 2017 ¹⁷⁹	Accuracy across all diseases if more than one category		71	71				50									
Breen, 2017 ¹⁷⁹	Fractures	NA (all fractures)	71	71				12									
Smidfelt, 2017 ¹⁸⁰	Aortic aneurysm and dissection	AAD - Abdominal					175	86		67							33

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
		aortic aneurysm															
Bartiaux, 2017 ¹⁸¹	Accuracy across all diseases if more than one category		332	332				20									
Chompoopong, 2017 ¹⁸²	Stroke	Stroke - Ischemic stroke	2303	90000			1384	919		60.1							
Podolnick, 2017 ¹⁸³	Fractures	NA (all fractures)	1009	196			178	18		90.8							
Freedman, 2017 ¹⁷	Abdominal radiograph not performed		282225	282225				30581									
Freedman, 2017 ¹⁷	Abdominal radiograph performed		282225	282225				21333									
Bayne, 2017 ¹⁸⁴			216	216													
Bayne, 2017 ¹⁸⁴	Testicular torsion	Undetermined	216	216				12									
Bayne, 2017 ¹⁸⁴			216	216													
Yi, 2017 ¹⁸⁵	Stroke	Undetermined				71	88					55.35					
Kondis, 2017 ¹⁸⁶	Fractures	NA (all fractures)	2284	2284		0.00716846	0.05734767		0.93548387		100	#Num!					
Moonen, 2017 ¹⁸⁸	Accuracy across all diseases if more than one category		56	56				6									
Moonen, 2017 ¹⁸⁸	Fractures	Humerus	56	56				1									

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Moonen, 2017 ¹⁸⁸	Fractures	Foot	56	56				2									
Moonen, 2017 ¹⁸⁸	Fractures	Pelvis	56	56				1									
Moonen, 2017 ¹⁸⁸	Fractures	Spine	56	56				2									
Moonen, 2017 ¹⁸⁸	Fractures	Thorax	56	56				1									
Nevo, 2017 ¹⁸⁹	Testicular torsion	Torsion of the spermatic cord	134	134			59	13		81.9							
Mouthon-Reignier, 2016 ¹⁹⁰	Stroke	Stroke - Ischemic stroke	81	81		24	57	0	0	100	0	70.37	#Num!				
Rostanski, 2016 ¹⁹¹	Stroke	Stroke - Ischemic stroke	350	350		48	302	0	0	100	0	86.29	#Num!			86.3	13.7
Heitmann, 2016 ¹⁹⁴	Accuracy across all diseases if more than one category		162	162			151	13		92.1							
Calic, 2016 ¹⁹⁵	Stroke	Stroke - Ischemic stroke				0	76	39	0	66.1	#Num!	100	0				
Hansen, 2016 ¹⁹⁸			151	151													
Hansen, 2016 ¹⁹⁸	Accuracy across all diseases if more than one category		151	151				48									
Madsen, 2016 ²⁰⁰	Stroke	Stroke - Ischemic stroke	2027	2027		0	1744	283		86		100					

Author, Year	Condition	Subtype	Total N	Total ED N	Pre-test probability (prevalence)	False positives (FP)	True positives (TP)	False negatives (FN)	True Negatives (TN)	Sensitivity (calc)	Specificity (calc)	Positive predictive value (calc)	Negative predictive value (calc)	Positive likelihood ratio	Negative likelihood ratio	Concordant	% Discordant
Rosenkrantz, 2016 ²⁰³	Accuracy across all diseases if more than one category		3940	3940				785									
Aaronson, 2016 ²⁰⁴	Accuracy across all diseases if more than one category		1006	1006				20	127				86.39				
Aaronson, 2016 ²⁰⁴	Patients >72 hours returns		1006	1006				124	735				85.56				
Arch, 2016 ²⁰⁵	Stroke	Stroke - Ischemic stroke	465	465			362	103		77.8							
Metcalfe, 2016 ²⁰⁷	Aortic aneurysm and dissection	AAD - Abdominal aortic aneurysm	85	85			64	21		75.3						75.29	24.7
Mirete, 2005 ²¹²	Accuracy across all diseases if more than one category		528	528		0	424	104	0	80.3	#Num!	100	0			80.3	19.7
Geyer, 2013 ²¹⁴			581	375													
Geyer, 2013 ²¹⁴	Fractures	NA (all fractures)	581	375	N=375		336	39		89.6							

AAD: Aortic aneurysm and dissection; aOR: Adjusted odds ratio; CI: Confidence Interval; DecrRisk: Decreased Risk; Dx Error: Diagnostic Error; ED: Emergency Department; IncrRisk: Increased Risk; ISS: Injury Severity Score; NA: Not applicable; OR: Odds Ratio; STEMI: ST-elevated myocardial infarction; VTE: Venous thromboembolism

Table D-4. Results of studies that reported on causes of diagnostic errors in the emergency department

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Month of visit	DecrRisk - Significan t	OR (ref July- December), 0.693 (p<0.0001)	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Health insurance	Mixed (specify)	Range in OR for expected primary payer (reference = private), 0.801 to 1.124	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Inpatient occupancy rate	DecrRisk - Significan t	Range in OR for occupancy rate (ref = low), 0.576 to 0.625	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Off hours	No effect - narrow CI	OR (ref = weekend), 0.994	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Ethnicity	No effect - narrow CI	OR, 1.193	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	ED crowding	Mixed (specify)	Range in OR for ED crowding on day of visit (ref = low), 0.781 (p=0.0085) for high to 0.910 (p=0.2590) for medium	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Average discharge fraction	DecrRisk - Significan t	Range in OR for percent admitted from ED (ref = low), 0.150 to 0.497	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Access to testing	DecrRisk - Significant	Range in OR for availability of cardiac catheterization lab (ref = not available), 0.186 to 0.777	111973	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Age	DecrRisk - Significant	OR range 0.492 to 0.700 (ref 18-44 years)	111973	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Population density	Mixed (specify)	Range in OR (ref = large metropolitan area), 0.856 to 1.968	111973	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	ED volume/annual visits	No effect - narrow CI	Range in OR (ref = low), 0.951 to 1.080	111973	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Ownership/b usiness model	No effect - narrow CI	Range in OR (ref = private, not-for- profit), 0.944 to 0.990	111973	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Teaching status	DecrRisk - Significant	OR (ref = non- teaching), 0.603; p = 0.0002	111973	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Sex	No effect - narrow CI	OR, 0.988 (ref female)	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	SES/Income	No effect - narrow CI	Range in OR for median household income by ZIP code (ref = highest), 0.906 to 1.067	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Geographic region	Mixed (specify)	Range in OR (ref = Northeast), 0.664 to 2.169	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Moy, 2015 ²⁴	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: HCUP databases Numerator: Numerator and denominator	Race	IncrRisk - Significan t	OR range, 1.314 to 1.452 (ref White)	111973	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Race	Reported but not quantified	Frequency of serious neurologic event and in hospital death within 30 days after ED discharge with diagnosis of headache and back pain, overall In hospital death or serious neurologic events within 30 days after ED discharge for Headache, No. (%) Non-His		NOT STAGE SPECIFIC	Other (specify): Serious neurological disorder or in-hospital death	Either/Both
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Ethnicity	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Health insurance	Reported but not quantified	Frequency of serious neurologic event and in hospital death within 30 days after ED discharge with diagnosis of headache and back pain, overall In hospital death or serious neurologic events within 30 days after ED discharge for Headache, No. (%) Medicare		NOT STAGE SPECIFIC	Other (specify): Serious neurological disorder or in-hospital death	Either/Both
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Age	Reported but not quantified	Frequency of serious neurologic event and in hospital death within 30 days after ED discharge with diagnosis of headache and back pain, Sample Size: Headache: 10,374 Sample Size: Backache: 2,850 In hospital death or serious neurologic events within 30		Unclear or NR	Other (specify): Serious neurological disorder or in-hospital death	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	SES/Income	Reported but not quantified	Frequency of serious neurologic event and In hospital death within 30 days after ED discharge with diagnosis of headache and back pain, overall In hospital death or serious neurologic events within 30 days after ED discharge, No for Headache. (%)		NOT STAGE SPECIFIC	Other (specify) : Serious neurological disorder or in-hospital death	Either/Both
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Sex	Reported but not quantified	Frequency of serious neurologic event and In hospital death within 30 days after ED discharge with diagnosis of headache and back pain, overall Sample Size: Headache: 10,374 Sample Size: Backache: 2,850 In hospital death or serious neurologic events		NOT STAGE SPECIFIC	Other (specify) : Serious neurological disorder or in-hospital death	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Number of Comorbidities	Reported but not quantified	Frequency of serious neurologic event and In hospital death within 30 days after ED discharge with diagnosis of headache and back pain, overall In hospital death or serious neurologic events within 30 days after ED discharge for Headache, No. (%) 0 5440				
Dubosh, 2015 ¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Time of Year (Quarter)	Reported but not quantified	Frequency of serious neurologic event and In hospital death within 30 days after ED discharge with diagnosis of headache and back pain, overall In hospital death or serious neurologic events within 30 days after ED discharge for Headache, No. (%) Jan-Mar			Other (specify) : Serious neurological disorder or in-hospital death	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
March, 2014 ²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Mode of arrival	Not reported					
March, 2014 ²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Triage intake severity	Not reported					
March, 2014 ²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Mixed (specify)	A negative triple test (WCC, CRP level and preoperative diagnostic imaging, all three tests negative/equivocal) was a strong indicator of a negative appendicitis (p=0.0158, NPV: 0.91, 95% CI: 0.59–0.99).		ED Dx Process	Appendicitis	
March, 2014 ²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Diagnostic Imaging	Mixed (specify)	A positive triple test (combination of a positive imaging result, elevated CRP and a raised WCC) was a strong predictor of appendicitis (p=0.0213, PPV: 1.00, 95% CI: 0.40–1.00).	81	NOT STAGE SPECIFIC	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Hospital size (small, medium, or large; based on the Healthcare Cost and Utilization Project definitions that consider number of beds, location, and teaching status	DecrRisk - Significant	Range in aOR, 0.46 to 0.5	371638	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Geographic region	Mixed (specify)	range in aOR 0.35 to 1.24	371638		Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	percentage of emergency physicians who are US trained	No effect - narrow CI	aOR 0.92 (p > 0.01)	371638	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	percentage of emergency physicians who are male	No effect - narrow CI	aOR 0.98 (p > 0.01)	371638	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	ED's average chest pain acuity (percentage of all chest pain patients diagnosed with AMI within 1 week of ED visit)	DecrRisk - Significant	aOR, 0.23; 99% CI, 0.19 to 0.27	371638	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Volume of chest pain patients seen	DecrRisk - Significant	aOR = 0.65, 99% CI = 0.51 to 0.82	371638	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Technology score (hospitals' overall technology level using a Saidin index)	DecrRisk - Significant	Range in aOR based on increased level of technology score, 0.51 to 0.7		NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Training background	DecrRisk - Significant	aOR, 0.60; 99% CI, 0.50 to 0.73	371638	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	Mixed (specify)	aOR for African American = 1.26, p < 0.01; range in aOR for race, Asian, and Native American, 0.91 to 1.44 (p > 0.01)	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	SES/Income	No effect - narrow CI	aOR 0.97	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	No effect - narrow CI	aOR 0.83	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Teaching status	DecrRisk - Significan t	aOR = 0.74, 99% CI = 0.58 to 0.94	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Access to testing	DecrRisk - not sig	aOR, 0.87 (p>0.01)	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ownership/b usiness model	Mixed (specify)	aOR for private hospital 0.92 (p>0.01); aOR for public hospital 1.33, 99% CI = 1.08 to 1.61 (reference = nonprofit)	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	Mixed (specify)	Range in aOR for women, 0.33 to 0.87 (p < 0.01 for older women); range in aOR for men, 1.05 to 1.46 (p > 0.01 for most age categories)	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Population density	IncrRisk - Significan t	Range in aOR (ref = urban), 1.47 to 2.61	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ethnicity	No effect - narrow CI	aOR 1.18	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Clinical experience	No effect - narrow CI	aOR 0.93 (p>0.01)	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Wilson, 2014 ²⁸	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Off hours	No effect - narrow CI	Range in aOR for individual days of week (ref = Sunday), 0.93 to 1.03	371638	NOT STAGE SPECIFI C	Myocardial infarction	Dx Error
Graff, 2014 ²⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	ACS testing threshold (percent of chest pain cases seen by that physician who were evaluated with hospitalizati on or observation)	DecrRisk - Significan t	r = 0.45, p < 0.001	6472	Learning from error	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Graff, 2014 ²⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Feedback of return visit	DecrRisk - Significant	Missed ACS rate decreased from 1.5% in 1997 to 0.3% in 2007	6472	Learning from error	Myocardial infarction	Dx Error
Faiz, 2014 ³⁰	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Unclear or NR	Pre-hospital delay <=3.5 hours vs. >3.5 hours	IncrRisk - Significant	Median in-hospital time intervals comparing prehospital delay <=3.5 hr to > 3.5 hr: Evaluation by a nurse 8 vs. 15; Examination by a doctor 20 vs. 80; Initiation of a CT scan 51 vs. 138	290	Pre-hospital interval	Stroke	Dx Error
Pirozzi, 2014 ¹⁹	Study design: Randomized controlled trial Look back or look forward analysis: Both Data source: Prospective data collection Numerator: Numerator and denominator	Tests ordered	DecrRisk - Significant	Frequency of incorrect initial diagnosis POC-US used: 5% (4 out of 88) POC-US not used: 50% (40 out of 80) (Fisher's test p < 0.0001).	168	ED Dx Process	Other (specify): undifferentiated dyspnea	Either/Both
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	ED visit not complete	IncrRisk - Significant	OR, 2.94	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Ownership/business model	Mixed (specify)	Range in OR, 0.80 to 0.99	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	IncrRisk - Significant	Range in OR, 1.18 to 1.29	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Geographic region	DecrRisk - not sig	Range in OR, 0.84 to 0.97	187,188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	DecrRisk - Significant	OR 0.75	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	ED volume/annual visits	Mixed (specify)	Range in OR, 1.11 to 1.57	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	DecrRisk - Significant	Range in OR, 0.19 to 0.43	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	SES/Income	IncrRisk - not sig	Range in OR, 1.05 to 1.06	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Teaching status	IncrRisk - Significant	OR, 1.45	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health insurance	Mixed (specify)	Range in OR, 0.63 to 1.01	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	ED crowding	No effect - wide CI	Range in OR, 0.98 to 1.08	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Current discharge fraction	IncrRisk - Significant	Range in OR, 1.40 to 6.34	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Average discharge fraction	IncrRisk - Significant	Range in OR, 1.24 to 1.55	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Inpatient occupancy rate	No effect - wide CI	Range in OR, 1.00 to 1.11	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Off hours	IncrRisk - Significant	OR, 1.11	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Population density	Mixed (specify)	Range in OR, 0.77 to 1.23	187,188	NOT STAGE SPECIFIC	Stroke	MisDx Harm

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Newman-Toker, 2014 ³³	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Ethnicity	IncrRisk - Significant	OR 1.30	187188	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Geographic region	IncrRisk - Significant	western Canada (OR 1.21, p < 0.02)				
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Type of treating hospital	IncrRisk - Significant	Non-children's OR=1.42 95%CI: 1.13–1.79 P=0.003 Children's (reference)		NOT STAGE SPECIFIC	Appendicitis	Dx Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Domicile	No effect - wide CI	Rural OR=1.02 95%CI: 0.90–1.16 P=0.72 Urban (reference)	41405	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Race	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Geographic region	Mixed (specify)	Ontario OR=0.91 95%CI: 0.77–1.09 P=0.30 West OR=1.21 95%CI: 1.02–1.44 P=0.03 Territories OR=1.51 95%CI: 0.93–2.46 P=0.10 Maritime reference	41405	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	SES/Income	Mixed (specify)	Socioeconomic status Lowest OR=0.81 95%CI: 0.70–0.94 P=.06 2nd lowest OR=0.95 95%CI: 0.82–1.09 P=0.23 Middle OR=0.91 95%CI: 0.79–1.04 P=0.78 2nd highest OR=0.82 95%CI: 0.71–0.94 P=0.06 Highest (reference)	41405	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Sex	DecrRisk - Significant	Male OR=0.43 95%CI: 0.39–0.48 P=0.0001	41405	NOT STAGE SPECIFIC	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Ethnicity	Not reported					
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Age	Mixed (specify)	0–5 years old OR=1.51 95%CI: 1.2–1.84 P=0.0001 6–11 years old OR=0.79 95%CI: 0.71–0.87 P=0.0001 12–17 years old (reference)	41405	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Language	Not reported					
Cheong, 2014 ³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Discharge Abstract Database (DAD) Numerator: Numerator only (error/harm)	Health literacy	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Grosmaitre, 2013 ³⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Atypical presentation	IncrRisk - Significant	Waiting time > 1 hour: 11.4% with chest pain and 36% with atypical presentation; decision-making > 1 hour, 23.8% with chest pain, 54% with atypical presentation	255	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Torres-Macho, 2013 ³⁸	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Electrocardiogram	Mixed (specify)	Range in OR, 2.5 to 4.3 for group 2 and range in OR, 2.3 to 5 for group 3: dyspnea decreased risk(s), less nonspecific and less severe symptoms like cough, or fever, pleuritic Chest pain, hemoptysis, pulmonary infiltrate on CXR: increased risk significant	436	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Torres-Macho, 2013 ³⁸	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Chest x-ray	Mixed (specify)	% with pulmonary infiltrate, 11% among those diagnosed in the ED, 24.4% among those diagnosed in the hospital, 34% among those diagnosed on readmission.	436	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Torres-Macho, 2013 ³⁸	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male, 51.4% among those diagnosed in the ED, 49.4% among those diagnosed in the hospital, 38.4% among those diagnosed on readmission	436	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Torres-Macho, 2013 ³⁸	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	Mixed (specify)		436	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Torres-Macho, 2013 ³⁸	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	range in OR, 2.5 to 4.3 for group 2 and range in OR, 2.3 to 5 for group 3: dyspnea decreased risk(S), less specific and less severe symptoms like cough, or fever, pleuritic Chest pain, hemoptysis, pulmonary infiltration on CXR: Increased Risk-significant	436	ED Dx Process	Venous thromboembolism	Dx Error
Torres-Macho, 2013 ³⁸	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Age	Mixed (specify)	Mean age, 67.3 in group 1 (those diagnosed in the ED), 71.5 in group 2 (those diagnosed in the hospital), 61.4 in group 3 (those diagnosed on readmission)	436	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	Decreased Risk - not sig	(<6.9 years) Referent (6.9–9.6 years) OR=0.60 (0.28–1.32) (9.7–12.6 years) OR=0.49 (0.22–1.13)	816	NOT STAGE SPECIFIC	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Primary language	No effect - wide CI	Obese	816	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI					
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Language	IncrRisk - not sig	English Referent Spanish OR=1.38 (0.63–3.02)				
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	IncrRisk - not sig	White Referent African American OR=3.05 (0.38–24.67)	816	NOT STAGE SPECIFIC	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health insurance	IncrRisk - not sig	Private Referent Medicaid OR=1.42 (0.52–3.87)	816	NOT STAGE SPECIFIC	Appendicitis	
Naiditch, 2013 ³⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Ethnicity	IncrRisk - not sig	Hispanic OR=3.20 (0.64–16.03)				
Sarraj, 2015 ⁴¹	Study design: Cross-sectional Look back or look forward analysis: Data source: Electronic health record data Numerator: Unclear or NR	Symptom type	Mixed (specify)		252	NOT STAGE SPECIFIC	Stroke	Dx Error
Sarraj, 2015 ⁴¹	Study design: Cross-sectional Look back or look forward analysis: Data source: Electronic health record data Numerator: Unclear or NR	Mode of arrival	Reported but not quantified	NR	252	NOT STAGE SPECIFIC	Stroke	Dx Error
Mohamed, 2013 ⁴²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	Reported but not quantified		93	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mohamed, 2013 ⁴²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Teaching status	DecrRisk - not sig	Rates of misdiagnosis among hospitals without vs. with a residency program: emergency medicine, 16.2% vs. 12.5%; neurology, 18% vs. 6.3%	93	NOT STAGE SPECIFIC	Stroke	Dx Error
Guillan, 2012 ⁴³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - not sig	% female for stroke vs. stroke mimics, 51.8% vs. 66.6%	621	NOT STAGE SPECIFIC	Stroke	Dx Error
Guillan, 2012 ⁴³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	DecrRisk - Significant	% with clinical symptoms ranged from 1.3 to 64.3% in stroke patients and 0 to 80% in stroke mimics.	621	NOT STAGE SPECIFIC	Stroke	Dx Error
Guillan, 2012 ⁴³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	NIHSS score at 0 hours was 13 for ischemic stroke and 8 for stroke mimics.	621	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Guillan, 2012 ⁴³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Mean age for stroke vs. stroke mimics, 72 vs. 53.7	621	NOT STAGE SPECIFIC	Stroke	Dx Error
Lever, 2013 ⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Atypical presentation	IncrRisk - Significant	OR, 43.4	189	NOT STAGE SPECIFIC	Stroke	Dx Error
Snoek, 2013 ²	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	IncrRisk - Significant	Revised Trauma Score (RTS) OR 0.68 (0.55-0.84), P-value <0.001		NOT STAGE SPECIFIC	Other (specify): delayed diagnosed injury of trauma patient (including fracture, myocardial contusion, pneumothorax, intracerebral bleed, renal contusion)	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Snoek, 2013 ²	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Number of injuries	IncrRisk - Significant	Number of injuries OR for delayed dx pts 1.63 (CI 1.31-2.02), p-value <0.001		NOT STAGE SPECIFIC	Other (specify): delayed diagnosed injury of trauma patient (including fracture, myocardial contusion, pneumothorax, intracerebral bleed, renal contusion)	Either/Both
Snoek, 2013 ²	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	GCS, ISS, ISS/10	Mixed (specify)	GCS OR (for delayed diagnosis pts): 0.78 (0.69-0.88), P-values <0.001 ISS OR (for delayed diagnosis pts): 1.11 (1.07-1.15), P-values <0.001 ISS/10 OR (for delayed diagnosis pts): 2.82 (1.94-4.08), P-values <0.001		NOT STAGE SPECIFIC	Other (specify): delayed diagnosed injury of trauma patient (including fracture, myocardial contusion, pneumothorax, intracerebral bleed, renal contusion)	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Snoek, 2013 ²	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - not sig	No difference by %Male: delayed diagnosis 76.9%, non-delayed diagnosis 60.4%, p =0.228 p-value	475	NOT STAGE SPECIFIC	Other (specify): delayed diagnosed injury of trauma patient (including fracture, myocardial contusion, pneumothorax, intracerebral bleed, renal contusion)	Either/Both
Snoek, 2013 ²	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - not sig	Diagnostic Delay Mean Age 47.7 (CI 20), Non-Diagnostic Delay: 40.8 (17.9), P-value: 0.202	475	NOT STAGE SPECIFIC	Other (specify): delayed diagnosed injury of trauma patient (including fracture, myocardial contusion, pneumothorax, intracerebral bleed, renal contusion)	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Snoek, 2013 ²	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	IncrRisk - Significant	Mobile Medical Team OR for delayed dx pt 6.82 (CI 1.36-34.18), p-value 0.020	475	Pre-hospital interval	Other (specify): delayed diagnosed injury of trauma patient (including fracture, myocardial contusion, pneumothorax, intracerebral bleed, renal contusion)	Either/Both
Crosby, 2013 ¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Provider type/role	Not reported					
Crosby, 2013 ¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Training background	IncrRisk - Significant	Surgeons had a total of nine patients with misdiagnoses or complicated 72 h returns during the study period compared with four patients who were treated by emergency physicians (p=0.052). There is an overall trend towards fewer missed diagnoses by emerge	2415	ED Dx Process	Other (specify): triage diagnosis of head trauma, abdominal pain, testicular torsion	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Crosby, 2013 ¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	Reported but not quantified		2415	ED Dx Process	Other (specify): triage diagnosis of head trauma, testicular pain, abdominal pain	Either/Both
Muhm, 2012 ³	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	Reported but not quantified	Group A w/o diagnostic delay: mean age 44 Group B w/diagnostic delay: mean age 42	111		Other (specify): delayed diagnosis after primary/secondary trauma survey	Dx Error
Muhm, 2012 ³	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Off hours	Mixed (specify)	Admission to the emergency room Time interval Weekday 08:01–16:00 Group A (without delay in diagnosis) n (%)25 (29) Group B (with delay in diagnosis) n (%)5 (20) Weekday 16:01-8:00 Group A (without delay in diagnosis) n (%)36 (42) Group B (with delay	111	NOT STAGE SPECIFIC	Other (specify): delayed diagnosis after primary/secondary trauma survey	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Muhm, 2012 ³	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	Reported but not quantified	Whole Body CTs Performed Group A w/o diagnostic delay: 64% Group B w/diagnostic delay: 92% P-Value: not reported				
Muhm, 2012 ³	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	Mixed (specify)	Mean ISS after Primary Survey: Group A w/o diagnostic delay: 17.0 Group B w/diagnostic delay: 26.9 P-Value <0.0001 Mean ISS after Secondary Survey: Group A w/o diagnostic delay: 17.0 Group B w/diagnostic delay: 29.2 P-Value <0.0001 NACA: 'Scores h	111		Other (specify) : delayed diagnosis after primary/secondary trauma survey	Dx Error
Muhm, 2012 ³	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Reported but not quantified	Group A w/o diagnostic delay: 71% male Group B w/diagnostic delay: 76% male	111		Other (specify) : delayed diagnosis after primary/secondary trauma survey	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Hochberg, 2011 ⁴⁷	Study design: Randomized controlled trial Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	No effect - wide CI	Sensitivity for 2nd year vs. 3rd year residents, 93% vs. 81%	83	Unclear or NR	Stroke	Dx Error
Hochberg, 2011 ⁴⁷	Study design: Randomized controlled trial Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Size of aneurysm	DecrRisk - Significant	(1) Sensitivity for aneurysms ≥ 3 mm vs. < 3 mm, 73% vs. 29% (2) Sensitivity for aneurysms in anterior communicating artery vs. middle cerebral artery vs. internal carotid artery vs. posterior circulation vs. posterior communicating artery, 95% vs. 76% vs.	84	ED Dx Process	Stroke	Dx Error
Martin, 2011 ⁴⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	No effect - wide CI	$p > 0.05$	91	Multiple stages	Stroke	Dx Error
Martin, 2011 ⁴⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	No effect - wide CI	$p = 0.311$	91	Multiple stages	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Martin, 2011 ⁴⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	No effect - wide CI	p = 0.512	91	Multiple stages	Stroke	Dx Error
Martin, 2011 ⁴⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	p = 0.205	91	Multiple stages	Stroke	Dx Error
Martin, 2011 ⁴⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	No effect - wide CI	p = 0.079 (pediatric): first contact w medical center	91	Multiple stages	Stroke	Dx Error
Martin, 2011 ⁴⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	p = 0.551	91	Multiple stages	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Postma, 2012 ⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Symptom type	Reported but not quantified	No. of injuries Mean no. of injuries (range, median) in hospitalized patients (N=66, 8 with DDI, 58 w/o DDI) Hospitalized Pt with DDI: 5.6 (1–12, 5) Hospitalized Pt without DDI: 2.2 (0–11, 1.5) % of patients with >5 injuries Hospitalized Pt with DDI:	126	NOT STAGE SPECIFIC	Other (specify): Delayed diagnosis of injury after a plane crash	Either/Both
Postma, 2012 ⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Other (specify) Numerator: Numerator and denominator	Triage intake severity	Reported but not quantified	Mean ISS (range, median); N=66, 8 with DDI, 58 w/o DDI Hospitalized Pt with DDI: 19.5(4–57; 11) Hospitalized Pt without DDI: 8.6(1–34, 5) # with Head injury (AIC=>2) Hospitalized Pt with DDI: 3 (of 8) Hospitalized Pt without DDI: 13 (of 58)			Other (specify): Delayed diagnosis of injury after a plane crash	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Race	No effect - wide CI	Median time to diagnosis for white race vs. non-white race, 4.23 vs. 3.58 h; p = 0.619	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Tests ordered	Mixed (specify)	The initial diagnostic test and its results had incremental impact on the time to diagnosis (Table 3). Patients with an ECG suggestive of myocardial ischemia required more time to establish the diagnosis of aortic dissection. Abnormalities on the chest x-	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Sex	IncrRisk - Significant	Delay time ratio for females, 1.73; p = 0.001	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Symptom type	Mixed (specify)	Delay in time ratio, 0.61 p = 0.001 for posterior chest pain; 0.53 p = 0.001 for worst pain ever; 5.11 p < 0.001 for febrile; 0.43 p = 0.002 for abrupt onset of pain; 2.45 p < 0.001 for admission SBP >=105 mmHg	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Tests ordered	Mixed (specify)	Median time to diagnosis by first imaging test: CT vs. other, 3.93 vs. 5.00 p = 0.005; TEE/TTE vs. other, 4.62 vs. 4.00 p = 0.14; MRI vs. not 96.00 vs. 4.07 p = 0.012; Aortogram vs. not 16.50 vs. 4.00 p = 0.014	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Triage intake severity	Not reported					
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Mode of arrival	IncrRisk - Significant	Delay time ratio for transferred from another hospital, 3.34, p < 0.001	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Atypical presentation	IncrRisk - Significant	Median time to Dx for mild pain (yes: 17 vs No: 3.78; p=0.008), febrile (32.5 vs 4.1; p=0.001), No pain vs any pain (24 vs 4.01; p<0.001)	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Harris, 2011 ⁴⁹	Study design: Retrospective cohort Look back or look forward analysis: Data source: AAD database Numerator: Numerator only (error/harm)	Age	No effect - narrow CI	Median time to diagnosis for age >=70 years vs. < 70 years, 5.04 vs. 4.02; p = 0.051	894	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Smith, 2012 ⁵⁰	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	OR for male vs. female, 0.96 (95% CI, 0.58 to 1.60)	400	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Smith, 2012 ⁵⁰	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	OR for age > 65 years vs. age <=65 years, 1.38 (95% CI, 1.09 to 1.75) from multivariate analysis	400	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Miedema, 2011 ⁵¹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - narrow CI	% male with delay <=120 min vs. delay >120 min, 73.9% vs. 70.6%, p = 0.12	2015	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Miedema, 2011 ⁵¹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Mean age with delay <=120 min vs. delay >120 min, 61.3 vs. 64.0, p < 0.001	2015	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Atzema, 2011 ⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	Median door-to-ECG time (min) for high priority vs. low priority patients, 14.0 vs. 28.0, p < 0.001	6605	ED Dx Process	Myocardial infarction	Dx Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	Reported but not quantified	Concordant diagnosis group vs. discordant diagnosis group: % white 53% vs. 55%; % black 38% vs. 34%	429	NOT STAGE SPECIFIC	Stroke	Dx Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Reported but not quantified	38% and 37% of the concordant and discordant diagnosis groups were male.	429	NOT STAGE SPECIFIC	Stroke	Dx Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	OR, 0.53	429	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	IncrRisk - not sig	OR, 1.20	436	NOT STAGE SPECIFIC	Stroke	Dx Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Ethnicity	Reported but not quantified	Concordant diagnosis group vs. discordant diagnosis group: % Hispanic 6% vs. 10%	429	NOT STAGE SPECIFIC	Stroke	Dx Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	Reported but not quantified	Median age is 60 in the concordant diagnosis group and 57 in the discordant diagnosis group.	429	NOT STAGE SPECIFIC	Stroke	Dx Error
Schrock, 2012 ⁵³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Atypical presentation	Mixed (specify)	Range in OR, 0.54 to 3.19	429	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Augustin, 2011 ⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	No effect - wide CI	Male N=218 Mean=9.2 Female N=137 Mean=10.7 P=0.16	380	Patient interval	Appendicitis	Dx Error
Augustin, 2011 ⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	DecrRisk - Significant	Right lower quadrant tenderness 7.6 (6; 0.7-39) vs 12.2 (6.8; 0.4-127)			Appendicitis	
Augustin, 2011 ⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Reported but not quantified					
Augustin, 2011 ⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Race	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Augustin, 2011 ⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Multiple	IncrRisk - not sig	Heart rate <100 n=231 Mean=9 ≥100 n=96 Mean=12 P=0.22 Temperature (°F) >101.5 n=21 Mean=7.8 (6.6; 1-26) ≤101.5 n=308 Mean=9.3 (6.5; 0.7-64) P=0.65 Right lower quadrant tenderness No n=167 Mean=12.2 Yes n=182 Mean=7.6 P=0.01 Classic presentation No n=228 M	380	Patient interval		
Augustin, 2011 ⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	No effect - wide CI	≤15 N=71 Mean=8.5 15-45 N=180 Mean=9.9 45-55 N=52 Mean=9 >60 N=52 Mean=8.9 P=0.68	380	Patient interval	Appendicitis	Dx Error
Tsivgoulis, 2011 ⁵⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Stroke registry data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male for stroke mimics vs. confirmed AIS, 45% vs. 56%; p = 0.096	539	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Tsivgoulis, 2011 ⁵⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Stroke registry data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Mean age for stroke mimics vs. confirmed AIS, 56 vs. 67; $p > 0.001$	539	NOT STAGE SPECIFIC	Stroke	Dx Error
Tsivgoulis, 2011 ⁵⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Stroke registry data Numerator: Numerator and denominator	Triage intake severity	IncrRisk - Significant	Median admission NIHSS score in points for stroke mimics vs. confirmed AIS, 6 vs. 8; $p < 0.001$	539	NOT STAGE SPECIFIC	Stroke	Dx Error
Tsivgoulis, 2011 ⁵⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Stroke registry data Numerator: Numerator and denominator	Current smoking	No effect - wide CI	% current smoking for stroke mimics vs. confirmed AIS, 32% vs. 33%; $p = 0.858$	539	NOT STAGE SPECIFIC	Stroke	Dx Error
Willner, 2012 ⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Clinical experience	Reported but not quantified	many of the pelvic DDIs were due to radiology residents missing subtle, nondisplaced torus fractures of the pubic rami what were later noted by an attending physician'		ED Dx Process	Other (specify): 'many of the pelvic DDIs were due to radiology residents missing subtle, nondisplaced torus fractures of the pubic rami what were later noted by an attending physician'	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Willner, 2012 ⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Age	Mixed (specify)	Age (y) All patients (N = 324) 7.5 Patients with DDI (n = 26) 11 Patients without DDI (n = 298) 7 DDI vs no DDI, P value .1	324	NOT STAGE SPECIFIC	Other (specify): delayed diagnosis of injury in pediatric trauma patient	Either/Both
Willner, 2012 ⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Triage intake severity	IncrRisk - Significant	ISS Score, Median Patients w/DDI (n=26): 12.5 Patients w/o DDI(n=298): 5 p-value: <.001	324	NOT STAGE SPECIFIC	Other (specify): delayed diagnosis of injury in pediatric trauma patient	Either/Both
Willner, 2012 ⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Tests ordered	Mixed (specify)	Median Total # of CT Scans: DDI: 4 (IQR 3-4) No DDI: 3 (IRQ 1-4) P=.03 Median Total # Radiologic Studies: DDI: 6.5 (IQR 6-8) No DDI: 6 (IQR 4-8) P=.09			Other (specify): delayed diagnosis of injury in pediatric trauma patient	
Willner, 2012 ⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Blunt mechanism, n (%) All patients (N = 324) 296 (91.4) Patients with DDI (n = 26) 25 (96.2) Patients without DDI (n = 298) 271 (90.9) DDI vs no DDI, P value .71	324	NOT STAGE SPECIFIC	Other (specify): delayed diagnosis of injury in pediatric trauma patient	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Willner, 2012 ⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Sex	Mixed (specify)	Patients with DDI (n = 26) 20 (76.9) Patients without DDI (n = 298) 173(58.1) DDI vs no DDI, P value .06	324	NOT STAGE SPECIFIC	Other (specify): delayed diagnosis of injury in pediatric trauma patient	Either/Both
Kuruville, 2011 ⁶⁰	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male among misdiagnosed vs. correctly diagnosed, 50% vs. 38.7%	57	NOT STAGE SPECIFIC	Stroke	Dx Error
Kuruville, 2011 ⁶⁰	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Smoking	No effect - wide CI	% active smoker among misdiagnosed vs. correctly diagnosed, 0% vs. 22.4%, p = 0.33; % past smoker among misdiagnosed vs. correctly diagnosed, 0% vs. 24.5%, p = 0.18	57	NOT STAGE SPECIFIC	Stroke	Dx Error
Kuruville, 2011 ⁶⁰	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - wide CI	% Black race among misdiagnosed vs. correctly diagnosed, 25% vs. 28.6%; p = 0.73	57	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Kuruville, 2011 ⁶⁰	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	The rate of misdiagnosis was 5% among those with anterior circulation (n = 41) and 38% among those with posterior circulation (n = 16); p = 0.006. The rate of misdiagnosis was 11% among those with migraine (n=9) and 15% among those without migraine (n =	57	NOT STAGE SPECIFIC	Stroke	Dx Error
Kuruville, 2011 ⁶⁰	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age for misdiagnosed vs. correctly diagnosed, 34.3 vs. 38.7; p = 0.18; 33% of those under age 35 were misdiagnosed vs. 9% of those over age 35; p = 0.052	57	NOT STAGE SPECIFIC	Stroke	Dx Error
Pare, 2016 ⁶²	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	IncrRisk - Significant	1) median time to diagnosis, 80 minutes for FOCUS group, 226 minutes for non-FOCUS group 2) Missed dissection 0% in FOCUS group, 43.8% in non-FOCUS group	32	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Ferree, 2016 ¹	Study design: Retrospective cohort Look back or look forward analysis: Data source: Other (specify) Numerator: Numerator and denominator	Level of consciousness, GCS=<8	No effect – wide CI	Patients with delayed diagnosed injuries N=172; Level of consciousness GCS=<8 (N, %): 43 (25); Patients without delayed diagnosed injuries N=1244; Level of consciousness GCS=<8 (N, %): 388 (31); p-value: 0.099	1416	Multiple stages	Fractures, Other (specify): ligament/te ndon injuries, external wounds, burns, bowel perforation, hemothorax	Either/Both
Ferree, 2016 ¹	Study design: Retrospective cohort Look back or look forward analysis: Data source: Other (specify) Numerator: Numerator and denominator	Sex	Reported but not quantified	Patients with delayed diagnosed injuries N=172; Male gender (N, %): 118 (69); Patients without delayed diagnosed injuries N=1244; Male gender (N, %): 864 (69); p-value: 0.821	1416	NOT STAGE SPECIFIC	Fractures, Other (specify): ligament/te ndon injuries, external wounds, burns, bowel perforation, hemothorax	Either/Both
Ferree, 2016 ¹	Study design: Retrospective cohort Look back or look forward analysis: Data source: Other (specify) Numerator: Numerator and denominator	Mode of arrival	Mixed (specify)	Patients with delayed diagnosed injuries N=172; Direct transport to OR (N, %): 25 (15); Patients without delayed diagnosed injuries N=1244; Direct transport to OR (N, %): 170 (14); p-value: 0.756; Patients with delayed diagnosed injuries N=172; Transport	1416	Multiple stages	Fractures, Other (specify): ligament/te ndon injuries, external wounds, burns, bowel perforation, hemothorax	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Ferree, 2016 ¹	Study design: Retrospective cohort Look back or look forward analysis: Data source: Other (specify) Numerator: Numerator and denominator	Age	Reported but not quantified	Patients with delayed diagnosed injuries N=172; Age overall (years; IQR): 44 (33–61); Patients without delayed diagnosed injuries N=1244; Age overall (years; IQR): 48 (28–67); p-value: 0.211	1416	NOT STAGE SPECIFIC	Fractures, Other (specify): ligament/te ndon injuries, external wounds, burns, bowel perforation, hemothorax	Either/Both
Vinz, 2015 ⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Malpractice claims Numerator: Numerator and denominator	Tests ordered	Reported but not quantified	% Omitted or incomplete Medical history and physical examination 36 Failure to perform further diagnostics including imaging 28	195	NOT STAGE SPECIFIC		Dx Error
Wireklint Sundström, 2015 ⁶⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Unclear or NR	Teaching status	Mixed (specify)	Differences in the median times between university and county hospitals ranged from 1< minute to almost 1 hour.	1376	ED Dx Process	Stroke	Dx Error
Carlton, 2015 ⁶⁹	Study design: Prospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	Reported but not quantified		912	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Carlton, 2015 ⁶⁹	Study design: Prospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Atypical presentation	Reported but not quantified	Specificity ranged from 51.3% to 57.%; sensitivity ranged from 39.3% to 53.1%	912	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Goulet, 2015 ⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	Reported but not quantified	Failure to order appropriate diagnostic tests in 18 of 47 (38%) deaths w/in 72 hours of admission.	47	ED Dx Process		Either/Both
Goulet, 2015 ⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	Reported but not quantified		47	NOT STAGE SPECIFIC		Either/Both
Groot, 2016 ⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Troponin levels at baseline and peak troponin	DecrRisk - Significant	median hs-troponin baseline: 0 vs 59 ng/l; p<0.001, peak hs-troponin: 32 vs 2601 ng/l; p<0.001 in false activation vs. STEMI groups	827	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Groot, 2016 ⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	aOR, 0.598	827	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Groot, 2016 ⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	DecrRisk - Significant	aOR, 0.963	827	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Groot, 2016 ⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	IncrRisk - Significant	Interhospital transfer, 26% of false-positive activation, 16% STEMI	827	Pre-hospital interval	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Weinberg, 2010 ⁷⁴	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	Mixed (specify)	Age >18 N 234 Fx rate (%) 25 Sensitivity 78 Specificity 93 LR+ 9.6 (6.2–14.9) LR- 0.30 (0.21–0.42) Age <18 N 114 Fx rate (%) 22 Sensitivity 60 Specificity 92 LR+ 7.6 (3.5–16.6) LR- 0.43 (0.27–0.70)	348	NOT STAGE SPECIFIC		Either/Both
Weinberg, 2010 ⁷⁴	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Training background	Mixed (specify)	Sonologist with 25 US exams N 127 Fx rate (%) 26 Sensitivity 61 Specificity 89 LR+ 5.7 LR- N 221 Fx rate (%) 23 Sensitivity 80 Specificity 94 LR+ 13.7 (7.4–25.3) LR-0.21 (0.12–0.36)		NOT STAGE SPECIFIC		

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Vanbrabant, 2009 ⁷⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Observed relative risk of return visit Initial symptom Diarrhea Observed relative risk of return 4.07 95% CI 1.94-8.16 Initial symptom Abdominal pain Observed relative risk of return 1.72 95% CI 1.20-2.43 Initial symptom Fever Observed relative risk		NOT STAGE SPECIFIC	Other (specify): Return to ED w/in 72 of discharge	Either/Both
Ravichandiran, 2010 ⁷⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - Significant	Male vs female gender OR: 2.00 95% CI: 1.03-3.80	258	NOT STAGE SPECIFIC	Fractures	Either/Both
Ravichandiran, 2010 ⁷⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Setting	IncrRisk - not sig	Setting Primary care office vs pediatric ED OR: 5.20 95% CI 1.77-15.39 General ED vs pediatric ED OR: 7.20 95% CI: 3.00-17.30		NOT STAGE SPECIFIC	Fractures	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Ravichandiran, 2010 ⁷⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Extremity versus axial skeleton fracture	IncrRisk - Significant	Extremity vs axial skeleton fracture OR :2.30 95% CI: 1.10–4.77	258	NOT STAGE SPECIFIC	Fractures	Either/Both
Hoekstra, 2009 ⁷⁸	Study design: Controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Smoker	No effect - wide CI	% smoker for 12-lead STEMI, 80-lead STEMI, and 12-lead non-STEMI, 31, 32, 31	236	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Hoekstra, 2009 ⁷⁸	Study design: Controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age for 12-lead STEMI, 80-lead STEMI, and 12-lead non-STEMI, 63.8, 66.4, and 63.6	236	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Hoekstra, 2009 ⁷⁸	Study design: Controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male for 12-lead STEMI, 80-lead STEMI, and 12-lead non-STEMI, 60, 68, and 70	236	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Race	Not reported					
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	SES/Income	Not reported					
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	Not reported					
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Language	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	IncrRisk - Significant	The median time from triage arrival to CT order was 138 minutes in females vs 95 minutes in males for a difference of 43 minutes (95% CI, 15-60; P = .0012). The median time from initial physician evaluation to CT order was 45 minutes in females and 28 mi	137	NOT STAGE SPECIFIC	Appendicitis	Dx Error
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Ethnicity	Not reported					
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Health literacy	Not reported					
McGann Donlan, 2009 ⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Health insurance	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Williams, 2009 ⁸¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	Mixed (specify)	Hospital transfer Relative Risk 0.77 p: not significant Air transportation Relative Risk 1.49 p<0.05	1100	Pre-hospital interval	Fractures	Either/Both
Chung, 2009 ²²	Study design: Cross-sectional Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Provider type/role	Reported but not quantified	Discrepancy rate between resident and attending radiologist: 2% (95 of 4768) Discrepancy rate between 2 attending radiologists (15%) (17 of 112)			Other (specify): discrepancy in read of CT torso between radiology resident and attending	Either/Both
Gaughan, 2009 ⁸²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	% misdiagnosed among patients who were stable vs. in shock, 58.9% vs. 26.2%, p = 0.002; Patients who were hemodynamically stable at presentation had a significantly longer delay to diagnosis than those who were in shock (p,0.0001)	98	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	MisDx Harm
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Race	Mixed (specify)	Range in adjusted time ratio for door-to-doctor time, 0.89 to 0.99; range in adjusted time ratio for door-to-image time, 0.87 to 1.23 (ref = white race)	1992	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Range in aTR for door-to-doctor time, 0.61 to 1.23; range in aTR for door-to-image times, 0.85 to 1.33	1992	NOT STAGE SPECIFIC	Stroke	Dx Error
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	IncrRisk - Significant	Adjusted time ratio for door-to-doctor time and door-to-image time, 1.11 and 1.15 (ref = males)	1992	NOT STAGE SPECIFIC	Stroke	Dx Error
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Onset to arrival interval	DecrRisk - Significant	Range in aTR for door-to-doctor times, 0.67 to 0.79 (ref = symptoms >= 6 hours or unknown); range in aTR for door-to-image times, 0.63 to .80	1992	NOT STAGE SPECIFIC	Stroke	Dx Error
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Nursing home resident	IncrRisk - Significant	aTR for door-to-image time for nursing home resident vs. not, 1.31	1992	NOT STAGE SPECIFIC	Stroke	Dx Error
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	No effect - narrow CI	Range in adjusted time ratio for door-to-doctor times, 0.99 to 1.02; range in time ratios for door-to-image times, 0.93 to 1.02 (ref >=80 years old)	1992	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Gargano, 2009 ⁸³	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Mode of arrival	DecrRisk - Significant	aTR comparing arrived by emergency medical services vs. not for door-to-doctor time, 0.65 and door-to-image time, 0.76	1992	NOT STAGE SPECIFIC	Stroke	
Winkler, 2009 ⁸⁴	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	% with global aphasia without hemiparesis for stroke vs. mimics, 3.3% vs. 42.9%, p = 0.002	250	NOT STAGE SPECIFIC	Stroke	Dx Error
Winkler, 2009 ⁸⁴	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	No effect - wide CI	% male for those with stroke vs. stroke mimics, 58.8% vs. 57.1%, p = 0.68	250	NOT STAGE SPECIFIC	Stroke	Dx Error
Winkler, 2009 ⁸⁴	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Triage intake severity	DecrRisk - not sig	Mean NIHSS score for stroke vs. mimics, 13.67 vs. 9.9, p = 0.06	250	NOT STAGE SPECIFIC	Stroke	Dx Error
Winkler, 2009 ⁸⁴	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Smoking	DecrRisk - not sig	% current smoking among stroke vs. mimics, 21.4% vs. 0%	250	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Winkler, 2009 ⁸⁴	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age for those with stroke vs. stroke mimics, 67.9 vs. 68.1; p = 0.96	250	NOT STAGE SPECIFIC	Stroke	Dx Error
Filippi, 2008 ²³	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Multiple Numerator: Numerator and denominator	Provider type/role	Reported but not quantified	MRI discrepancy reading between radiology residents and attending radiologists: 26 of 361 cases (7.2%); 15 of 261 were major discrepancies	361	ED Dx Process	Other (specify): MRI reading discrepancy between radiology residents and attendings	Either/Both
Filippi, 2008 ²³	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Multiple Numerator: Numerator and denominator	Clinical experience	IncrRisk - Significant	Year of Training 1 Total No. of Discrepancies 14 (10.9) Year of Training 2 Total No. of Discrepancies 5 (4.7) Year of Training 3 Total No. of Discrepancies 7(6.0) Year of Training 4 Total No. of Discrepancies 0 Note.—Data are number of examination	26	NOT STAGE SPECIFIC	Other (specify): MRI reading discrepancy between radiology residents and attendings	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Rapezzi, 2008 ⁸⁵	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Range in OR, 0.078 to 3.96	161	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Rapezzi, 2008 ⁸⁵	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Atypical presentation	No effect - wide CI	OR for >=1 'characteristic' finding vs. not, 1.24 (95% CI, 0.48 to 3.18)	161	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Rapezzi, 2008 ⁸⁵	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	IncrRisk - Significant	OR for age <70 years vs. >=70 years, 2.34 (95% CI, 1.03 to 5.36)	161	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Rapezzi, 2008 ⁸⁵	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	No effect - wide CI	OR for males vs. females, 1.83 (95% CI, 0.80 to 4.20)	161	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Race	No effect - wide CI	% white for TIA vs. NI-TNA, 52.5% vs. 36.7%, p = 0.150	100	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom onset	IncrRisk - Significant	gradual symptom onset aOR, 6.7, p = 0.002	100	NOT STAGE SPECIFIC	Stroke	Dx Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	No effect - wide CI	% male for TIA vs. NI-TNA, 52.5% vs. 31.7%, p = 0.06	100	NOT STAGE SPECIFIC	Stroke	Dx Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Increased/significant: Nonspecific symptoms (: aOR 4.2, p 0.008 *nonspecific symptoms included non-rotary lightheadedness, pain such as throat tightness or chest pain, gastrointestinal symptoms, or 'ill feeling', or vague cognitive symptoms No effect- wi			Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Tests ordered	Mixed (specify)	% in TIA vs NI-TNA: Nonsignificant difference for magnetic resonance imaging, Significant difference for neurovascular imaging (inc), echocardiography(inc), and electroencephalography(dec)	100	NOT STAGE SPECIFIC	Stroke	Dx Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Triage intake severity	No effect - wide CI	ABCD2 > 3 for TIA vs. NI-TNA, 55% vs. 55%, p = 1.0	100	NOT STAGE SPECIFIC	Stroke	Dx Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom duration, time from symptom onset to ED arrival	No effect - wide CI		100	NOT STAGE SPECIFIC	Stroke	Dx Error
Prabhakaran, 2008 ⁸⁶	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age for TIA vs. NI-TNA, 63.0 vs. 59.5, p = 0.298	100	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	IncrRisk - Significant	B coefficients (positive numbers indicate longer delay times) for female vs. male, 0.06, $p < 0.001$	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Health insurance	No effect - narrow CI	Median CT delay in hours for Medicare patients, patients with no insurance, and patients with other insurance, 1.2, 1.1, 1.2	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Mode of arrival	DecrRisk - Significant	B coefficients (positive numbers indicate longer delay times) for EMS arrival vs. other mode, -0.36, $p < 0.0001$	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	No effect - narrow CI	Median CT delay in hours for patients aged 18-44, 45-64, 65-74, and 75+, 1.2, 1.2, 1.2, and 1.2	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Race	Mixed (specify)	B coefficients (positive numbers indicate longer delay times) for Black vs. White, 0.09, $p < 0.0001$ and for Other vs. White, -0.01, $p > 0.05$	15117	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Teaching status	Mixed (specify)	B coefficients (positive numbers indicate longer delay times) for JCPSC teaching, JCPSC nonteaching, not JCPSC teaching (ref = not JCPSC not teaching), 0.12 p < 0.0001, -0.02 p > 0.05, 0.21 p < 0.001	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	No effect - narrow CI	Median delay in CT imaging in hours for ambulation at admission vs. not, 1.2 vs. 1.2	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Off hours	Mixed (specify)	B coefficients (positive numbers indicate longer delay times) for time of day of arrival: evening vs. daytime -0.09 p > 0.05; late night vs. daytime, -0.18 p < 0.0001; weekend vs. weekday -0.07 p < 0.0001	15117	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Arrival at hospital within 2 hours of symptom onset	IncrRisk - Significant	% Receiving a CT scan within 25 minutes of hospital arrival among patients arriving at hospital within 2 hours of symptom onset vs. >2 hours of symptom onset vs. unknown symptom onset time, 23.6%, 8.8% vs. 6.7%	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Rose, 2008 ⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Presumptive diagnosis at arrival	Mixed (specify)	B coefficients (positive numbers indicate longer delay times) for IS, HS, and TIA (ref = stroke not specified), -0.01 p > 0.05, -0.13 p < 0.0001, and 0.21 p < 0.0001	15117	NOT STAGE SPECIFIC	Stroke	Dx Error
Montmany, 2008 ⁵	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	IncrRisk - Significant	Mean ISS among those with no unnoticed injuries vs. with unnoticed injuries, 18.3 vs. 22.4; p = 0.01	122	NOT STAGE SPECIFIC	Other (specify): missed injury in polytrauma patients	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Montmany, 2008 ⁵	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Prehospital intubation; hospital intubation	No effect - narrow CI	Prehospital intubation among those with no unnoticed injuries vs. with unnoticed injuries, 15.8% vs. 36.4%, p = 0.024 Hospital intubation among those with no unnoticed injuries vs. with unnoticed injuries, 25% vs. 51.5%, p = 0.009	122	NOT STAGE SPECIFIC	Other (specify): missed injury in polytrauma patients	Either/Both
Piper, 2008 ⁸⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Perforation	No effect - wide CI	The time interval from presentation in the emergency room to surgery did not differ significantly for patients with or without perforation or for patients who had preoperative imaging versus those who did not.	134	Patient interval	Appendicitis	Dx Error
Piper, 2008 ⁸⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Off hours	IncrRisk - Significant	Median door-to-balloon time for nighttime vs. daytime presentation, 132 vs. 112 p < 0.05, and for weekend vs. weekday presentation, 133 vs. 122 p < 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	No effect - wide CI	Median door-to-balloon time for age >=65 to age < 65 years, 132 vs. 122, p > 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Health insurance	No effect - wide CI	Median door-to-balloon time for uninsured vs. not, 131 vs. 123 p > 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Language	IncrRisk - Significant	Median door-to-balloon time for English-speaking vs. not, 134 vs. 118, p < 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Mode of arrival	No effect - wide CI	Median door-to-balloon time for arrived by ambulance vs. not, 119 vs. 130 p > 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Median door-to-balloon time for left ventricular ejection fraction < 0.05 vs. not, 142 vs. 123 p > 0.05; and for cardiogenic shock vs. not, 183 vs. 128 p < 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	No effect - wide CI	Median door-to-balloon time for male sex vs. female sex, 122 vs. 130, p > 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Tobacco use	No effect - wide CI	Median door-to-balloon time for those with vs. without a family history of coronary artery disease, 122 vs. 126 p > 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Parikh, 2008 ⁸⁹	Study design: Registry Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Cocaine positive on admission	No effect - wide CI	Median door-to-balloon time for cocaine positive vs. negative on admission, 139 vs. 124 p > 0.05	184	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Musunuru, 2007 ⁹¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	No effect - wide CI	The negative appendectomy rate for patients diagnosed with appendicitis on CT was 8% (19:227). For all patients who underwent appendectomy without preoperative imaging, the negative appendectomy rate was 14% (22:155), which was not significantly different	411	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Kline, 2007 ⁹²	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Those with altered mental status at diagnosis were more likely to have a delayed diagnosis (8% vs. 30%, p = 0.009). Those who were immobile were less likely to have a delayed diagnosis (21% vs. 5%). Other symptoms were similar between groups.	161	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Kline, 2007 ⁹²	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Smoker	No effect - wide CI	% smoker among those with an ED diagnosis vs. a delayed diagnosis, 60% vs. 65%	161	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Kline, 2007 ⁹²	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - wide CI	% white among those with an ED diagnosis vs. a delayed diagnosis, 57% vs. 45%	161	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Kline, 2007 ⁹²	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male among those with an ED diagnosis vs. a delayed diagnosis, 59% vs. 60%	161	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Kline, 2007 ⁹²	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Mean age among those with an ED diagnosis vs. a delayed diagnosis, 51 vs. 61 p < 0.001	161	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Sun, 2007 ⁸	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	IncrRisk - not sig	Male Adjusted Odds Ratio: 1.8 95% Confidence Interval: 0.9-3.3	477	NOT STAGE SPECIFIC	Other (specify): Serious event after syncope discharge from ED	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sun, 2007 ⁸	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Race	DecrRisk - not sig	Nonwhite Adjusted Odds Ratio 0.7 95% Confidence Interval: 0.3–1.4	477	NOT STAGE SPECIFIC	Other (specify): Serious event after syncope discharge from ED	Either/Both
Sun, 2007 ⁸	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Ethnicity	DecrRisk - not sig	Hispanic Adjusted Odds Ratio 0.8 95% Confidence Interval: 0.3–2.6	477	NOT STAGE SPECIFIC	Other (specify): Serious event after syncope discharge from ED	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sun, 2007 ⁸	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	Mixed (specify)	Table 3. Multivariate Logistic Regression Model for 14-Day Serious Events Age 40–59 : OR 2.7 CI 0.9–8.4 60–79 : OR 3.8 CI 1.3–12.0 *SIGNIFICANT > 80: OR 3.8 CI 1.2–12.0 *SIGNIFICANT Adjusted Odds Ratio 95% Confidence Interval Reference group: 1	477	NOT STAGE SPECIFIC	Other (specify) : Serious event after syncope discharge from ED	Either/Both
Hansen, 2007 ⁹⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	aOR for age, 1.06 p = 0.02	66	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Hansen, 2007 ⁹⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	No effect - wide CI	Number of diagnostic tests among misdiagnosed vs. correctly diagnosed, 1.7 vs. 1.9 p = NS	66	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Hansen, 2007 ⁹⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	aOR for anterior chest pain, 7.12 p = 0.002	66	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Hansen, 2007 ⁹⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Not reported					
Vermeulen, 2007 ⁹⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	SES/Income	No effect - narrow CI	Range in aOR by income quintiles (ref = highest income quintile), 0.71 to 0.96	1507	NOT STAGE SPECIFIC	Stroke	Dx Error
Vermeulen, 2007 ⁹⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	No effect - narrow CI	% male among those with SAH not missed vs. missed SAH, 38.5% vs. 38.3% p > 0.05; aOR, 0.92	1507	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Vermeulen, 2007 ⁹⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Teaching status	IncrRisk - Significant	aOR, 2.12 (95% CI, 1.02 to 4.44)	1507	NOT STAGE SPECIFIC	Stroke	Dx Error
Vermeulen, 2007 ⁹⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	aOR for triaged low acuity vs. medium acuity, 2.65 and aOR for triaged high acuity vs. medium acuity, 0.18	1507	NOT STAGE SPECIFIC	Stroke	Dx Error
Vermeulen, 2007 ⁹⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	IncrRisk - Significant	Mean age among those with SAH not missed vs. missed SAH, 58.1 vs. 54.0, $p < 0.05$	1507	NOT STAGE SPECIFIC	Stroke	Dx Error
Vermeulen, 2007 ⁹⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Off hours	No effect - narrow CI	Range in aOR for evening and night shift (ref = day shift), 0.69 to 1.18 $p > 0.05$ for both, aOR for weekday vs. weeknight, 0.65	1507	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Tzovaras, 2007 ⁹⁶	Study design: Randomized controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	open or the laparoscopic appendectomy	Reported but not quantified	In the group of 38 male patients who were treated laparoscopically, the conversion rate was much higher, 18.5%, and the incidence of wrong diagnosis was only 5.2%. Overall, the incidence of wrong diagnosis in men was 3.8%.	78	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Tzovaras, 2007 ⁹⁶	Study design: Randomized controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	Reported but not quantified					
Tzovaras, 2007 ⁹⁶	Study design: Randomized controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Tests ordered	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Tzovaras, 2007 ⁹⁶	Study design: Randomized controlled trial Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	Reported but not quantified					
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	DecrRisk - Significant	Range in aOR for age groups (ref= age 20-49), 0.53 to 0.75	19,663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	Among those with AMI not missed vs. missed, % with resuscitation/emergent triage acuity is 57.1% vs. 31.7% and % with less urgent/nonurgent triage acuity is 4.3% vs. 13.9%	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Off hours	Mixed (specify)	aOR for weekday vs. weekend, 1.26 (95% CI 1.01 to 1.58); range in aOR evening and night vs. daytime, 0.76 to 1.01 p > 0.05	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	SES/Income	No effect - narrow CI	Range in aOR by income quintile (ref = highest income quintile), 0.95 to 1.31	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Teaching status	No effect - wide CI	aOR, 0.91	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Symptom type	Mixed (specify)	aOR for diabetes and congestive heart failure is 0.37 and 0.67. Shock, cancer, stroke, pulmonary edema, acute renal failure, chronic renal failure, and dysrhythmia were not significant, range in aOR, 0.84 to 1.43	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	No effect - narrow CI	aOR (female = reference), 1.08	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	ED AMI volume	Mixed (specify)	Very low and low ED AMI volume had an increased risk of missed AMI, range in aOR (ref = very high), 1.57 to 1.96; there was no statistically significant difference for medium and high, range in aOR, 1.20 to 1.33		NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Schull, 2006 ⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Visits to the same ED in previous year, per visit	No effect - narrow CI	aOR, 105	19663	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Gallagher, 2006 ¹³	Study design: Randomized controlled trial Look back or look forward analysis: Not a cohort study Data source: Prospective data collection Numerator: Numerator and denominator	received intravenous morphine for abdominal pain	No effect - wide CI	Clinically important diagnostic accuracy was 86% in the morphine group (67/78 provisional diagnoses correctly predicted the final diagnoses) versus 85% in the placebo group (64/75 provisional diagnoses correctly predicted the final diagnoses)	153	NOT STAGE SPECIFIC	Other (specify): Acute Abdominal Pain	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Graff, 2006 ⁹⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	IncrRisk - Significant	% female for ACS vs. not ACS, 51.1% vs. 57.7%	7888	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Graff, 2006 ⁹⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	No effect - narrow CI	% non-white for ACS vs. not ACS, 6.1% vs. 6.7%	7888	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Graff, 2006 ⁹⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	IncrRisk - Significant	% aged >=85 for ACS vs. not ACS, 24.6% vs. 36.3%	7888	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
England, 2006 ¹⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Use of antibiotics	No effect - wide CI	In-hospital delay Group 1 received antibiotics n=45 median=0 range=(0-2) Group 2 did not receive antibiotics n=266 median=0 range=(0-7) P=0.7	311	Patient interval	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
England, 2006 ¹⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	Reported but not quantified					
England, 2006 ¹⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Reported but not quantified					
England, 2006 ¹⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Atypical presentation	Reported but not quantified					
Hallas, 2006 ¹⁰²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	Mixed (specify)	Age years (s. d.) False Positive 31 (20.6) False negative 45.1 (27.7) Sum Diagnostic Errors 40.2 (26.2) Control group 44.7 (27.3) P NS No difference between a fracture location in misdiagnosed cases vs control		NOT STAGE SPECIFIC	Fractures	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Hallas, 2006 ¹⁰²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Mixed (specify)	Male: Female False Positive 8:13 False negative 19:21 Sum Diagnostic Errors 427:34 Control group 50:50 P NS No difference between a fracture location in misdiagnosed cases vs control		NOT STAGE SPECIFIC	Fractures	Either/Both
Hallas, 2006 ¹⁰²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	No effect - wide CI	Seen only by an intern False Positive 14 False negative 23 Sum Diagnostic Errors 37 Control group 86 P NS Intern + a resident 4 14 18 10 <0.05 False Positive 4 False negative 14 Sum Diagnostic Errors 18 Control group 10 P <.05 No difference between a fracture location in misdiagnosed cases vs control		NOT STAGE SPECIFIC		Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Gouin, 2006 ¹⁰³	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Other (specify) Numerator: Numerator and denominator	Access to EHR/EHR type	IncrRisk - not sig	Diagnostic accuracy pre-PCAS: 98.5 (87.5, 100) Diagnostic accuracy post-PCAS: 98.1 (94.5, 100) P-value: 0.39	3074	ED Dx Process	Other (specify): Peds Emergency physician accuracy of x-rays relative to radiologists	Either/Both
York, 2005 ¹⁰⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Reported but not quantified	The negative appendectomy rates were 10.4% (n = 11) and 4.4% (n = 4) for groups A (Imaging) and B (no Imaging), respectively. Group A patients had an average delay until surgery of 6.7 hours greater than their nonimaged counterparts.	197	NOT STAGE SPECIFIC	Appendicitis	Dx Error
York, 2005 ¹⁰⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Triage intake severity	Not reported					
York, 2005 ¹⁰⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Mode of arrival	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Tudela, 2005 ¹⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	IncrRisk - Significant	Dx error in ED: consult for fever	42			
Rønning, 2005 ¹⁰⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Unclear or NR Numerator: Numerator and denominator	Sex	IncrRisk - not sig	Among those who did not have stroke, 47/88 (53%) were women	88	NOT STAGE SPECIFIC	Stroke	Dx Error
Rønning, 2005 ¹⁰⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Unclear or NR Numerator: Numerator and denominator	Mode of arrival	No effect - wide CI	% that did not have stroke among those admitted via the Emergency Medical Communication Center (AMK) vs. referred by doctor or emergency department, 24% vs. 25%	354	NOT STAGE SPECIFIC	Stroke	Dx Error
Rønning, 2005 ¹⁰⁶	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Unclear or NR Numerator: Numerator and denominator	Age	IncrRisk - not sig	Average age among those with stroke vs. without stroke, 71.5 vs. 65.5 years	354	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Beaver, 2005 ¹⁰⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Training background	Reported but not quantified		100	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Garfield, 2004 ¹⁰⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests Ordered	Reported but not quantified	Negative Laparotomy Rate No imaging 5% (0, 12) Abdominal CT only 6% (0, 12) Abdominal sonogram only 12% (0, 42) CT and sonogram 15.8 12% (0, 42)	124	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Garfield, 2004 ¹⁰⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Reported but not quantified	Preoperative ED LOS Hours No imaging 6.6 (5.5-7.8) Abdominal CT only 15.8 (14.2-17.4) Abdominal sonogram only 10.0 (7.4-12.6) CT and sonogram 15.8 (13.0-18.6)	124	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Soundappan, 2004 ¹⁰⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Reported but not quantified	Sex (male) Missed Injuries, n=12 (%) 8 (66) Patients without Missed Injuries, n=64 (%) 42 (65)	76	NOT STAGE SPECIFIC	Other (specify): Missed injuries in pediatric trauma patients after primary and secondary survey	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Soundappan, 2004 ¹⁰⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Reported but not quantified	Of 12 patients that had missed injuries, it was presumed that 'head injury' was a contributing factor for delayed diagnosis			Other (specify): Missed injuries in pediatric trauma patients after primary and secondary survey	Either/Both
Soundappan, 2004 ¹⁰⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	Reported but not quantified	Mean ISS (n=12) of patients with missed injuries: 15 Mean ISS (n=64) of patients w/o missed injuries: 14			Other (specify): Missed injuries in pediatric trauma patients after primary and secondary survey	Either/Both
Soundappan, 2004 ¹⁰⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Language	Reported but not quantified	1 of 12 patients that experienced a diagnostic delay was related to a language barrier			Other (specify): Missed injuries in pediatric trauma patients after primary and secondary survey	Either/Both
Soundappan, 2004 ¹⁰⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	Reported but not quantified	Age (mean) Missed Injuries, n 12 (%) 8.6 Patients without Missed Injuries, n 64 (%) 8.4	76	NOT STAGE SPECIFIC	Other (specify): Missed injuries in pediatric trauma patients after primary and secondary survey	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Corral Gudino, 2003 ¹¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - not sig	Not compared statistically between groups: Male 60% vs 37%, NS			Venous thromboembolism	
Corral Gudino, 2003 ¹¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Risk factor	Mixed (specify)	DecRisk-significant: Surgery 0% vs 20.9%, p 0.05 DecRisk-NS: Immobilization, Fracture, cancer, hypertension, smoking, previous stroke IncrRisk-NS: Previous PE			Venous thromboembolism	
Corral Gudino, 2003 ¹¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	IncrRisk-Significant Dyspnea 100% vs 79.1% p0.05 DecRisk-NS chest pain, pleuritic pain, non-pleuritic pain, hemoptysis, IncrRisk-NS: cough, discomfort	58	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Corral Gudino, 2003 ¹¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	Mixed (specify)	TVP on Doppler less frequent in the misdiagnosed group but not significantly (Dec risk-NS); Higher number of segments affected on V/Q scan in misdiagnosed group (IncRisk-S); unclear whether tests were ordered at initial evaluation	58	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Corral Gudino, 2003 ¹¹¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	PE not suspected initially vs PE suspected initially: mean age 76 vs 70, p 0.05	58	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Liberman, 2020 ¹¹⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Multiple Numerator: Numerator and denominator	Tests ordered	IncrRisk - Significant	RR 1.9 (95% CI, 1.1 to 3.1)	20,592	NOT STAGE SPECIFIC	Stroke	MisDx Harm
Goyal, 2020 ¹¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Pediatric Emergency Care Applied Research Network (PECARN) Registry Numerator: Numerator and denominator	Race	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Goyal, 2020 ¹¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Pediatric Emergency Care Applied Research Network (PECARN) Registry Numerator: Numerator and denominator	Age	Reported but not quantified					
Goyal, 2020 ¹¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Pediatric Emergency Care Applied Research Network (PECARN) Registry Numerator: Numerator and denominator	Sex	Reported but not quantified					
Goyal, 2020 ¹¹⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Pediatric Emergency Care Applied Research Network (PECARN) Registry Numerator: Numerator and denominator	Ethnicity	Reported but not quantified	NH-white Referent NH-Black 1.81 (1.09–2.98) Hispanic 1.14 (0.73–1.79) Other 0.92 (0.48–1.78)	7298	NOT STAGE SPECIFIC	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Settelmeier, 2020 ¹¹⁸	Study design: Registry Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Mixed (specify)	OR 95% CI Age >75, % 1.70 (1.58–1.83) Smoking 0.51 (0.47–0.55) AHT 1.07 (0.99–1.16) Diabetes mellitus 0.85 (0.78–0.92) Hyperlipidemia 0.75 (0.70–0.81) BMI n.a CKD 0.72 (0.63–0.82) COPD 0.92 (0.77–1.11) OR, odds ratio; CI, confidence interval; RF, risk			Myocardial infarction	
Settelmeier, 2020 ¹¹⁸	Study design: Registry Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	IncrRisk - Significant	Age >75 years OR: 1.70 (1.58–1.83) 95% CI Females vs males			Myocardial infarction	
Gold, 2020 ¹¹⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator only (error/harm)	Symptom type	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Gold, 2020 ¹¹⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator only (error/harm)	Tests ordered	Not reported		3938			
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	SES/Income	Mixed (specify)	% median income < \$45k among not missed vs. missed AMI in the look-back analysis, 24.4% vs. 27.7%; % median income < \$45k among no AMI vs. missed AMI in the look-forward analysis, 26.9% vs. 27.6%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Education	Mixed (specify)	% with at least some college among not missed vs. missed AMI in the look-back analysis, 18.6% vs. 17.5%; % with at least some college among no AMI vs. missed AMI in the look-forward analysis, 19.0% vs. 17.7%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Married or partnered	Mixed (specify)	% married or partnered among not missed vs. missed AMI in the look-back analysis, 57% vs. 53.7%; % married or partnered among no AMI vs. missed AMI in the look-forward analysis, 47.5% vs. 55.5%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Race	Mixed (specify)	% Black among not missed vs. missed AMI in the look-back analysis, 11.5% vs. 14.5%, OR 1.3, 95% CI, 1.1 to 1.6, p=0.0077 vs. whites; % black among no AMI vs. missed AMI in the look-forward analysis, 13.4% vs. 12.6%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Smoking	IncrRisk - Significant	% active smoking among not missed vs. missed AMI in the look-back analysis, 12.1% vs. 11.5%; % active smoking among no AMI vs. missed AMI in the look-forward analysis, 8.3% vs. 12.4%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Mixed (specify)	% female among not missed vs. missed AMI in the look-back analysis, 36.6% vs. 43.4%, OR 1.3, 95% CI, 1.2 to 1.5, p<0.001; % female among no AMI vs. missed AMI in the look-forward analysis, 57.2% vs. 40.6%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Mean age of not missed vs. missed AMI in the look-back analysis, 67.9 vs. 68.9; Mean age of no AMI vs. missed AMI in the look-forward analysis, 48.9 vs. 68.7, one-year increase associated with OR 1.0 95% CI, 1.0 to 1.0, p<0.0001		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Ethnicity	Mixed (specify)	% Hispanic among not missed vs. missed AMI in the look-back analysis, 24.5% vs. 24.7%; % Hispanic no AMI vs. missed AMI in the look-forward analysis, 37.0% vs. 25.4% (possibly significant vs. whites)		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sharp, 2020 ¹²⁰	Study design: Retrospective cohort Look back or look forward analysis: Both Data source: Electronic health record data Numerator: Numerator and denominator	Language	No effect - narrow CI	% needs an interpreter among not missed vs. missed AMI in the look-back analysis, 7.5% vs. 7.5%; % needs an interpreter among no AMI vs. missed AMI in the look-forward analysis, 7.5% vs. 7.5%		NOT STAGE SPECIFIC	Myocardial infarction	Either/Both
Mansella, 2020 ¹²¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - narrow CI	% male among patients with early workup vs. delayed workup, 54.4% vs. 56.8%	226	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Mansella, 2020 ¹²¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Among patients with early workup vs. delayed workup, % with dyspnea, 59.9% vs. 45.5% p 0.117; % with chest pain, 49.5% vs. 18.2% p<0.001; % with nonspecific complaints, 8.8% vs. 29.5% p<0.001	266	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mansella, 2020 ¹²¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	Mixed (specify)	Among patients with early workup vs. delayed workup, % diagnosed with D-dimer testing, 70.9% vs. 6.8%; % diagnosed with echocardiography, 32.4% vs. 52.3%; % diagnosed with chest CT, 88.5% vs. 54.5% ; all p-values significant	226	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Mansella, 2020 ¹²¹	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Median age of patients with early workup vs. delayed workup, 67 vs. 77.5	226	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Smidfelt, 2020 ¹²²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% female among misdiagnosis vs. correct diagnosis, 30.5% vs. 28.4%	455	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Smidfelt, 2020 ¹²²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	DecrRisk - Significant	% whose rAAA diagnosis was verified with a CT scan among misdiagnosis vs. correct diagnosis, 67.2% vs. 82.4% p < 0.0001	455	ED Dx Process	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Smidfelt, 2020 ¹²²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	Mean serum creatinine (mmol) at admission among misdiagnosis vs. correct diagnosis, 123 vs. 133, p = 0.03; % with first recorded systolic blood pressure <=90 mmHg, 22.8% vs. 37.7%, p < 0.0001	455	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Smidfelt, 2020 ¹²²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age of misdiagnosis vs. correct diagnosis, 79.5 vs. 79.1, p = 0.66	455	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Kerkman, 2020 ¹²⁴	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: data set Numerator: Numerator and denominator	Sex	No effect - wide CI	Median system delay time for women vs. men, 97 vs. 93	787	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Kerkman, 2020 ¹²⁴	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: data set Numerator: Numerator and denominator	Age	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Chan, 2020 ¹²⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Not reported					
Chan, 2020 ¹²⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Delayed vs. not delayed, % without dyspnea 38.9% vs. 26.1%; % with cardiopulmonary disease, 52.8% vs. 23.5%; with altered mental status, 8.3% vs. 2.2%	302	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Chan, 2020 ¹²⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	% with delayed diagnosis among < 65, 65-84, and >=85, 50% vs. 80.8% vs. 92.9%, p = 0.038	302	NOT STAGE SPECIFIC	Venous thromboembolism	Dx Error
Mattijssen-Horstink, 2020 ¹²⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Hospital complication list and EHRs Numerator: Numerator and denominator	Age	Mixed (specify)	0 to 14 years 77 (26.6%) 15 to 64 years 145 (50.2%) 65 years and older 67 (23.2%) OR or RR not reported	289	NOT STAGE SPECIFIC	Fractures	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Liberman, 2020 ¹²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	IncrRisk - Significant	% female among no misdiagnosis vs. probable misdiagnosis, 44.3% vs. 61.9%, aOR, 1.76 (95% CI, 1.33 to 2.34)	7090	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2020 ¹²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	No effect - wide CI	aOR, 0.86 (95% CI, 0.54 TO 1.37) for black race	7090	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2020 ¹²⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	DecrRisk - Significant	Mean age among no misdiagnosis vs. probable misdiagnosis, 53.0 vs. 43.3, p < 0.001; aOR, 0.97 (95% CI, 0.96 to 0.98)	7090	NOT STAGE SPECIFIC	Stroke	Dx Error
Zaschke, 2020 ¹²⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Drug abuse, nicotine/alcohol	No effect - wide CI	% nicotine abuse among initial misdiagnosed vs. correct diagnosed, 32.7% vs. 21.6%, p = 0.067; % alcohol abuse initial misdiagnosed vs. correct diagnosed, 4.6% vs. 3.9%, p = 0.835	350	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Zaschke, 2020 ¹²⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male among initial misdiagnosed vs. correct diagnosed, 63.9% vs. 61.8%	350	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Zaschke, 2020 ¹²⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	aOR for angina pectoris, 0.31; for pain, lumbar region, 4.38; for sweating, 1.86; for any paresis, 1.85; for pain scapulae, 2.03	350	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Zaschke, 2020 ¹²⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age of initial misdiagnosed vs. correct diagnosed, 62.7 vs. 65.1; p = 0.162	350	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Osterwalder, 2020 ¹⁴	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Hospitalization at index visit	DecrRisk - Significant	0 of 170 hospitalized vs 27 of 310 discharged with outpatient treatment were misdiagnosed at index visit.	480	NOT STAGE SPECIFIC	Other (specify): abdominal pain	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	No effect - narrow CI	1.11 (0.79 1.56) 0.53	1922			
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Children's hospital	IncrRisk - not sig	Yes OR=1.22 (0.73 2.05)	1922	NOT STAGE SPECIFIC	Sepsis	Dx Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Has a pediatric ED/Has a pediatric intensive care unit	IncrRisk - not sig	Yes OR=1.20 (0.72 2.00) Yes OR=0.85 (0.42 1.76)		NOT STAGE SPECIFIC	Sepsis	Dx Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ownership/business model	Mixed (specify)	Private, nonprofit OR=1.39 (0.81 2.38) Private, for-profit OR=0.81 (0.24 2.79)	1922	NOT STAGE SPECIFIC	Sepsis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Geographic region	IncrRisk - Significant	California OR=2.26 (1.34 3.82) Florida OR=3.33 (1.95 5.70) Massachusetts OR=2.87 (1.35 6.09)	1922		Sepsis	Dx Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Teaching status	DecrRisk - not sig	Yes OR=0.81 (0.41 1.58)	1922	NOT STAGE SPECIFIC	Sepsis	Dx Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	ED volume/annual visits	No effect - narrow CI	OR=1.00 (1.00 1.00)	1622	NOT STAGE SPECIFIC	Sepsis	Dx Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Access to EHR/EHR type	DecrRisk - not sig	Yes OR=0.91 (0.62 1.35)	1922	NOT STAGE SPECIFIC	Sepsis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	No effect - narrow CI					
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	No effect - narrow CI	OR 1.00 (0.98, 1.03) 0.84	1922			
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Health insurance	No effect - narrow CI					
Cifra, 2020 ¹³⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ethnicity	No effect - narrow CI					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Fasen, 2020 ¹³¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Training background	IncrRisk - Significant	aOR for non-neuroradiologists vs. neuroradiologists, 5.62 (95% CI, 1.06 to 29.85)	60	NOT STAGE SPECIFIC	Stroke	Dx Error
Fasen, 2020 ¹³¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Location of LVO	IncrRisk - Significant	aOR for M2 segment vs. distal internal carotid artery and/or M1 segment, 5.69 (95% CI, 1.44 to 22.57)	82	NOT STAGE SPECIFIC	Stroke	Dx Error
Fasen, 2020 ¹³¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	No effect - wide CI	unadjusted OR for reporting of lateralizing symptoms/signs or suspected location of stroke on the request form for CTA, 0.91	84	ED Dx Process	Stroke	Dx Error
Fasen, 2020 ¹³¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Off hours	No effect - wide CI	unadjusted OR, 1.89 (95% CI, 0.63 to 5.70)	84	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Fasen, 2020 ¹³¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	No effect - wide CI	Range in aOR for senior residents vs. neuroradiologists and vs. non-neuroradiologists, 0.29 to 1.63	51	NOT STAGE SPECIFIC	Stroke	Dx Error
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	Reported but not quantified					
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	Reported but not quantified					
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Tests ordered	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Adults Total, No. 100833 Abdominal pain only 0.65 (0.62-0.69) Abdominal pain and constipation 1.51 (1.31-1.75) Abdominal pain and nausea and/or vomiting 0.90 (0.84-0.97) Abdominal pain, nausea and/or vomiting, and fever 0.78 (0.64-0.95) Abdominal pain	116678	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Health insurance	Reported but not quantified					
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Atypical presentation	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ethnicity	Reported but not quantified					
Mahajan, 2020 ¹³²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	Reported but not quantified					
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Race	Not reported					
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Examination by physician not in accordance with priority	IncrRisk - Significant	38.0 (16.1 to 59.8)	1307	NOT STAGE SPECIFIC	Sepsis	Dx Error
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Not triaged within 15 minutes	IncrRisk - Significant	25.8 (3.8 to 47.8)	1307	NOT STAGE SPECIFIC	Sepsis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Lactate not measured within 1 hour	IncrRisk - Significant	71.4 (56.0 to 86.8)	1307	NOT STAGE SPECIFIC	Sepsis	Dx Error
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Inadequate observation regimen	IncrRisk - Significant	23.9 (10.5 to 37.3)	1307	NOT STAGE SPECIFIC	Sepsis	Dx Error
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Reported but not quantified					
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	Reported but not quantified					
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	IncrRisk - Significant	Lactate not measured within 1 hour unadjusted 81.6 (65.9 to 97.2) model 1 86.2 (71.5 to 100.8) model 2 71.4 (56.0 to 86.8)	1559		Sepsis	

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Triage intake severity	IncrRisk - Significan t	Not triaged within 15 minutes unadjusted 54.4 (32.9 to 75.9) model 1 54.7 (33.2 to 76.2) model 2 25.8 (3.8 to 47.8)			Sepsis	
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Atypical presentation	Reported but not quantified					
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Ethnicity	Not reported					
Husabø, 2020 ¹³³	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mahajan, 2020 ¹³⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Main symptom at presentation Median, Range Headache True case (HDP) 36, 55.4% (43.0–67.1) True control (No HDP) 12, 26.1% (15.3–40.9) p-value 0.002 Visual disturbances True case (HDP) 17, 26.2% (16.8–38.4) True control (No HDP) 4, 8.7% (3.2–21.4)		NOT STAGE SPECIFIC	Other (Specify): Hypertensive Disorders of Pregnancy	Either/Both
Ois, 2019 ¹³⁸	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male of misdiagnosis vs. no misdiagnosis, 38.8% vs. 33.7%, p = 2.15	400	NOT STAGE SPECIFIC	Stroke	Dx Error
Ois, 2019 ¹³⁸	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Current smoking	No effect - wide CI	% current smoking among misdiagnosis vs. no misdiagnosis, 39.4% vs. 33.1%, p = 0.245	400	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Ois, 2019 ¹³⁸	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	IncrRisk - Significant	For both the Hunt and Hess scale and the Fisher scale, higher scores were associated with fewer misdiagnoses $p < 0.001$	400	NOT STAGE SPECIFIC	Stroke	Dx Error
Ois, 2019 ¹³⁸	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age of misdiagnosis vs. no misdiagnosis, 54.68 vs. 56.52, $p = 0.282$	400	NOT STAGE SPECIFIC	Stroke	Dx Error
Vasconcelos-Castro, 2020 ¹⁴⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Pain duration in hours	Reported but not quantified	Median, IQR Total N=73 5 3.0, 15.0 Abdominal pain n=16 22% 48 16.5, 72 Testicular pain (n = 57, 78%) 5 2, 6 Abdominal vs testicular pain (P value) <.001		NOT STAGE SPECIFIC	Testicular torsion	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Oliver, 2019 ¹⁴³	Study design: Retrospective cohort Look back or look forward analysis: Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Reported but not quantified	Diagnostic agreement by category, %: anterior segment, 70.2%; posterior segment, 57.6%; orbit & ocular adnexa, 80.3%; neurologic, 57.7%; uveitis, 92%; glaucoma, 73.7%	697	NOT STAGE SPECIFIC	Other (specify): ophthalmology consults	Dx Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% female among no diagnostic error vs. diagnostic error, 54.8% vs. 81.8%, p = 0.17	53	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - wide CI	% Black race among no diagnostic error vs. diagnostic error, 44.4% vs. 45.5%, p = 1.0; % other race, 36.1% vs. 45.5%, p = 0.73	53	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	SES/Income	No effect - wide CI	Mean SES score among no diagnostic error vs. diagnostic error, -2.8 vs. -3.0, p = 0.43	53	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	No effect - wide CI	Radiologic features for no diagnostic error vs. diagnostic error: cortical thrombosis, 16.7% vs. 9.1%; deep vein thrombosis, 9.5% vs. 9.1%; dural sinus thrombosis, 73.8% vs. 81.8%; ICH 35.7% vs. 36.4%	53	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Training background	No effect - wide CI	Neurology consultation obtained among no diagnostic error vs. diagnostic error, 95.2% vs. 81.8%, p = 0.19	53	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Language	No effect - wide CI	% non-English preferred language among no diagnostic error vs. diagnostic error, 12.8% vs. 0%, p = 0.57	53	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2019 ¹⁴⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age for no diagnostic error vs. diagnostic error, 49.3 vs. 42.2, p = 0.13	53	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Aneiros, 2019 ¹⁴⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Reported but not quantified					
Aneiros, 2019 ¹⁴⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	DecrRisk - Significant	One hundred and thirty children (8.9% of 1453) in the group C (6-15 years) and 45 children (15.9% of 283) in the group D (0-5 years) had previously been examined without a correct diagnosis (p=0.0003).	1736	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Hautz, 2019 ¹⁴⁸	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Triage intake severity	IncrRisk - not sig	Triage category (n [%]) See immediately Without diagnostic discrepancy n = 662 (87.68%) 36 (5.44%) With diagnostic discrepancy n = 93 (12.32%) 7 (7.53%) 0.281 Effect Size* Kendall's τ Estimate 0.04 CI -0.03 - 0.11	755	NOT STAGE SPECIFIC		Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Hautz, 2019 ¹⁴⁸	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	IncrRisk - not sig	Age (years; mean [SD]) Without diagnostic discrepancy n = 662 (87.68%) 64.84 (18.68) With diagnostic discrepancy n =93 (12.32%) 67.21 (16.17) p: 0.199 Effect Size* Type Cohen's d Estimate 0.13 95% CI§ -0.10 – 0.35	755	NOT STAGE SPECIFI C		Either/Bot h
Ohle, 2019 ¹⁵¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male among diagnosed vs. missed, 65.6 vs. 64.7, p =.19	194	NOT STAGE SPECIFI C	Aortic aneurysm and dissection	Dx Error
Ohle, 2019 ¹⁵¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age of diagnosed vs. missed, 65.2 vs. 65.6, p = 0.2	194	NOT STAGE SPECIFI C	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Prior smoking	DecrRisk - Significant	% prior smoking among treated STEMI vs. MAMI patients, 53.6% vs. 42%, p = 0.039	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - narrow CI	% indigenous among treated STEMI vs. MAMI patients, 3.6% vs. 4%	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom onset to presentation	No effect - narrow CI	Mean symptom onset to presentation among treated STEMI vs. MAMI patients, 150.5 vs. 155.6 minutes, p = 0.903	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - narrow CI	% male among treated STEMI vs. MAMI patients, 73.5% vs. 70%, p = 0.465	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	% anterior infarction among treated STEMI vs. MAMI patients, 41% vs. 67%, p = 0.000	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Population density	IncrRisk - Significant	% am MAMI patients presenting to small rural hospitals, 45%; metropolitan hospital without cardiac catheterization laboratory, 27%; rural referral hospital, 16%; tertiary hospital 11%	100	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - narrow CI	Mean age of treated STEMI vs. MAMI patients, 63.9 vs. 66.3, p = 0.302	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Williams, 2019 ¹⁵²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Off hours	No effect - narrow CI	Among treated STEMI vs. MAMI patients, % presenting to hospital between 7am to 3pm, 54.7% vs. 62% p = 0.190; 3pm to 11pm, 29.2% vs. 21% p = 0.115; 11pm to 7am, 15.8% vs. 17% p = 0.767	1392	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2019 ¹⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	SES/Income	No effect - wide CI	In hospital Death or Serious Neurologic Events Within 7 Days After ED Discharge, Risk(%) Median household income state quartile for patient zip code 1 st Q(lowest quartile) : 0.3%, 0.1% 2ndQ: 0.3%, 0.1% 3rd Q: 0.3%, 0.1% 4th Q (highest quartile) 0.3%,	2,101,081	NOT STAGE SPECIFIC	Other (specify) : Headache and Backpain	Either/Both
Dubosh, 2019 ¹⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	DecrRisk - Significant	In hospital Death or Serious Neurologic Events Within 30 Days After ED Discharge, aOR (95% CI) for headache and back pain, respectively: Non-Hispanic white: ref Non-Hispanic black 0.92 (0.87-0.98), 0.65 (0.57-0.74) Hispanic 0.76 (0.72-0.81), 0.70 (0.63-0	2,101,081	NOT STAGE SPECIFIC	Other (specify) : Headache and Backpain	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2019 ¹⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	DecrRisk - Significant	In hospital Death or Serious Neurologic Events Within 30 Days After ED Discharge, aOR (95% CI) for headache and back pain, respectively: Men: ref Women: 0.88 (0.84-0.92), 0.61 (0.56-0.66)	2,101,081	NOT STAGE SPECIFIC	Other (specify): Headache and Backpain	Either/Both
Dubosh, 2019 ¹⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Symptom type	DecrRisk - Significant	In hospital Death or Serious Neurologic Events Within 30 Days After ED Discharge, aOR (95% CI) for headache: Type of headache at the index visit migraine: ref non-migraine: 0.53 (0.50-0.56)		ED Dx Process	Other (specify): Headache and Backpain	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Dubosh, 2019 ¹⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Health insurance	Mixed (specify)	In hospital Death or Serious Neurologic Events Within 30 Days After ED Discharge, aOR (95% CI) for headache and back pain, respectively: Medicare ref Medicaid: 0.99 (0.92-1.08), 0.96 (0.83-1.11) Private: 0.95 (0.89-1.02), 0.78 (0.69-0.88) Self-pay:0.71	2,101,081	NOT STAGE SPECIFIC	Other (specify): Headache and Backpain	Either/Both
Dubosh, 2019 ¹⁵⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	IncrRisk - Significant	In hospital Death or Serious Neurologic Events Within 30 Days After ED Discharge, aOR (95% CI) for headache and back pain, respectively: Age 18-39 (ref) Age 40-64: 1.88 (1.79-1.98), 2.66 (2.35-3.01) Age 65-84: 3.19 (2.93-3.48), 5.93 (5.05-6.95) Age >8	2,101,081	NOT STAGE SPECIFIC	Other (specify): Headache and Backpain	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Huang, 2019 ¹⁵⁶	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Unclear or NR	Tests ordered	Mixed (specify)	Repeat ultrasound Orchiectomy (n = 60) 38% (23) Salvaged (n = 73) 18% (13) p-value 0.008 Single ultrasound Orchiectomy (n = 60) 62% (37) Salvaged (n = 73) 82% (60) p-value 0.008			Testicular Torsion	
Huang, 2019 ¹⁵⁶	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Unclear or NR	Mode of arrival	IncrRisk - not sig	Transferred from outside institution Orchiectomy (total n (transfer +primary)= 60) 58% (35) Salvaged (total n (transfer +primary) = 73) 45% (33) p-value 0.132	133	Pre-hospital interval	Testicular Torsion	Either/Both
Agrawal, 2019 ¹⁵⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - wide CI	% African American among true STEMI vs. false STEMI, 73% vs. 82%	361	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Agrawal, 2019 ¹⁵⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Smoking	No effect - wide CI	% smoking among true STEMI vs. false STEMI, 42% vs. 48%, p = 0.38	361	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Agrawal, 2019 ¹⁵⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Body mass index	No effect - wide CI	Median BMI among true STEMI vs. false STEMI, 28 vs. 28, p = 0.43	361	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Agrawal, 2019 ¹⁵⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	% male among true STEMI vs. false STEMI, 60% vs. 67%, p = 0.25	361	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Agrawal, 2019 ¹⁵⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	DecrRisk - Significant	aOR for chest pain vs other, 0.54 (95% CI, 0.32 to 0.93)	82	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Agrawal, 2019 ¹⁵⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Median age among true STEMI vs. false STEMI, 60 vs. 57, p = 0.32	361	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Kargl, 2019 ¹⁵⁸	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Symptom type	IncrRisk - not sig	The highest error rate was found in elbow trauma: in 12% of the cases radiography was misinterpreted initially (Table 1). Elbow injuries counted for a high rate of misses: in 14 of 20 errors fracture (12 supracondylar fractures, one lateral condyle fractures)	125	NOT STAGE SPECIFIC	Fractures	Either/Both
Raposo, 2018 ¹⁵⁹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Sex	No effect - wide CI	% female among evaluation initiated with 12 h vs. beyond 12 h, 47.3% vs. 52.9%, p = 0.29	354	NOT STAGE SPECIFIC	Stroke	Dx Error
Raposo, 2018 ¹⁵⁹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Age	No effect - wide CI	Mean age among evaluation initiated with 12 h vs. beyond 12 h, 60.1 vs. 62.5, p = 0.28	354	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Raposo, 2018 ¹⁵⁹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Tests ordered	No effect - wide CI	% with MRI performed among evaluation initiated with 12 h vs. beyond 12 h, 79.1% vs. 77.1%, p = 0.65; % with cervical & intracranial vessel imaging, 87.6% vs. 85.0%, p = 0.48	354	NOT STAGE SPECIFIC	Stroke	Dx Error
Raposo, 2018 ¹⁵⁹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	% with ABCD \geq 4 among evaluation initiated with 12 h vs. beyond 12 h, 43.3% vs. 31.4%	354	NOT STAGE SPECIFIC	Stroke	Dx Error
Raposo, 2018 ¹⁵⁹	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Prospective data collection Numerator: Numerator and denominator	Mode of arrival	DecrRisk - Significant	Among evaluation initiated with 12 h vs. beyond 12 h, % referred from office-based physician, 36.3% vs. 72.2%; % referred from emergency medical services, 63.7% vs. 26.8%, p < 0.0001	354	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Lindsey, 2018 ¹⁶¹	Study design: Retrospective cohort Look back or look forward analysis: Data source: Radiographs Numerator: Numerator and denominator	Provider type/role	DecrRisk - Significant	The sensitivity and specificity of the emergency medicine MDs were significantly improved with the assistance of the deep learning model (one-sided, two-sample Wilcoxon signed rank test for sensitivity: $P < 10^{-4}$, $d = 1.17$; specificity: $P < 10^{-5}$, $d = 1.24$)				
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Language	Not reported					
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Current smoking history	No effect - wide CI	% current smokers among misdiagnosis and control, 17% vs. 24%, $p = 0.092$	312	NOT STAGE SPECIFIC	Stroke	Dx Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Reported but not quantified				Stroke	

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Among misdiagnosis vs. control, % with altered mental status, 41% vs. 26% p = 0.004; % with LOC reduced, 42% vs. 30% p = 0.025; % with dizziness, 25% vs. 5% p < 0.0001; % with hemiparesis, 23% vs. 70% p < 0.0001; % with syncope/collapse, 17% vs. 4% p = 0.	312	NOT STAGE SPECIFIC	Stroke	Dx Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	Mixed (specify)	Among misdiagnosis vs. control, % who underwent MRI, 72% vs. 69%; median time to MRI, 66 h vs. 47 h	312	NOT STAGE SPECIFIC	Stroke	Dx Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	misdiagnosis vs control: % with ED triage resuscitation/emergency category 33% vs. 58% p < 0.0001; %	312	NOT STAGE SPECIFIC	Stroke	Dx Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Training background	IncrRisk - not sig	% admitted under neurology service among misdiagnosis vs. control, 65% vs. 89% p < 0.0001	312	NOT STAGE SPECIFIC	Stroke	Dx Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Age	Reported but not quantified				Stroke	

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Venkat, 2018 ¹⁶²	Study design: Case-control Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	No effect - wide CI	% with ambulance transport to hospital among misdiagnosis vs. control, 83% vs. 78% p = 0.36	312	NOT STAGE SPECIFI C	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Smoking	No effect - narrow CI	Among correct diagnosis vs. misdiagnosis, % current smoking, 24.0% vs. 18.0% p = 0.105; % previous smoking, 44% vs. 42% p = 0.641	1015	NOT STAGE SPECIFI C	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Alcohol use	Mixed (specify)	Among correct diagnosis vs. misdiagnosis, % heavy alcohol use, 13.3% vs. 17.3% p = 0.187; % acute alcohol use, 6.2% vs. 10.7% p = 0.048	1015	NOT STAGE SPECIFI C	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - narrow CI	% male among correct diagnosis vs. misdiagnosis, 56.6% vs. 52.0%, p = 0.290	1015	NOT STAGE SPECIFI C	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significan t	Among correct diagnosis vs. misdiagnosis, % with facial paresis, 47.9% vs. 30.7%; % with unilateral weakness 68.3% vs. 50.7%; speech disturbance 76.3% vs. 64.0%	1015	NOT STAGE SPECIFI C	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	NIHSS score on admission (ref 0-8), aOR for 9-15, 0.35 (95% CI, 0.16 to 0.76); aOR for >15, 0.30 (95% CI 0.09 to 1.05); Also, % with GCS score on admission < 15 were higher among correct diagnosis than misdiagnosis.	1015	NOT STAGE SPECIFIC	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	No effect - narrow CI	Admission doctor resident among correct diagnosis vs. misdiagnosis, 42.1% vs. 46.7% p = 0.295	1015	NOT STAGE SPECIFIC	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Off hours	No effect - narrow CI	% office hours among correct diagnosis vs. misdiagnosis, 34.6% vs. 38.0% p = 0.416	1015	NOT STAGE SPECIFIC	Stroke	Dx Error
Pihlasviita, 2018 ¹⁶⁴	Study design: Retrospective cohort Look back or look forward analysis: Unsure Data source: Electronic health record data Numerator: Numerator and denominator	Age	DecrRisk - Significant	aOR for misdiagnosis (ref <60 y): 60-80 y, 0.57 (95% CI, 0.38 to 0.87); >80 y, 0.55 (95% CI, 0.31 to 0.95)	1015	NOT STAGE SPECIFIC	Stroke	Dx Error
Sederholm Lawesson, 2018 ¹⁶⁷	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: electronic health records and patient interviews Numerator: Numerator and denominator	Sex	No effect - wide CI	Median (IQR) time from first medical contact to diagnostic ECG among men vs. women, 25 (15-49) vs. 33 (15-61) p = 0.09	449	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sederholm Lawesson, 2018 ¹⁶⁷	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: electronic health records and patient interviews Numerator: Numerator and denominator	Age	Not reported					
Liberman, 2018 ¹⁶⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	No effect - narrow CI	Among no misdiagnosis vs. probable misdiagnosis, % white 55.3% vs. 55.4%; % black 16% vs. 22.8%; % other 10.1% vs. 7.4%	5966	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2018 ¹⁶⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	No effect - narrow CI	% female among no misdiagnosis vs. probable misdiagnosis, 71.5% vs. 76.4%	5966	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2018 ¹⁶⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Health insurance	No effect - narrow CI	Among no misdiagnosis vs. probable misdiagnosis, % Medicare 19.7% vs. 8.8%; % Medicaid 23.1% vs. 25.5%; % private 47.0% vs. 54.6%; % self-pay/other 10.2% vs. 11.1%	5966	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Liberman, 2018 ¹⁶⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	DecrRisk - Significant	Mean age among no misdiagnosis vs. probable misdiagnosis, 44.4 vs. 38.5	5966	NOT STAGE SPECIFIC	Stroke	Dx Error
Liberman, 2018 ¹⁶⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ethnicity	No effect - narrow CI	Among no misdiagnosis vs. probable misdiagnosis, % Hispanic, 18.6% vs. 14.4%	5966	NOT STAGE SPECIFIC	Stroke	Dx Error
Miller, 2018 ¹²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	IncrRisk - not sig	Missed Diagnosis 10 (1.7) CT at index Yes 3 (1.6) No 7 (70.0) P value 0.893 Epoch Pre-intervention 3 (1.7) Post education 5 (2.3) Post- data review 1 (0.5) P value 0.337	582	ED Dx Process	Other(Specify): Headache	Dx Error
Chang, 2019 ¹⁶⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Mixed	Sex	Reported but not quantified	The rate of negative appendicectomy was 16.3% (16/98) in females and 7.3% (8/110) in males.	208	NOT STAGE SPECIFIC	Appendicitis	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Chang, 2019 ¹⁶⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Mixed	Tests ordered	Mixed (specify)	Comparing test results between negative and positive appendectomy patients WCC X ² =4.304 P=0.038 Neutrophils X ² =7.070 P=0.008 CRP X ² =4.053 P=0.044 Bilirubin X ² =10.860 P=0.001 GGT X ² =0.025 P=0.873 ALP X ² =2.259 P=0.133 ALT X ² =0.051 P=0.822	208	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Chang, 2019 ¹⁶⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Mixed	Age	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Waxman, 2018 ¹⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Race	Mixed (specify)	Dec/sig: Asian/pacific for MI (aOR 0.67), stroke (0.68), AD (0.65), SAH (0.52) Hispanic for MI (0.91), stroke (0.90) Inc/sig: Black for ruptured AAA (1.35), MI (1.18), stroke (1.09) other/unknown for stroke (1.07)	1561940	NOT STAGE SPECIFIC	Stroke, Myocardial infarction, Aortic aneurysm and dissection	Dx Error
Waxman, 2018 ¹⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Baseline ED use	IncrRisk - not sig	Range in aOR for number of ED discharges 365-46 d before index event, 1.24 to 1.40, p < 0.05 for all conditions	1561940	NOT STAGE SPECIFIC	Stroke, Myocardial Infarction, Aortic aneurysm and dissection	Dx Error
Waxman, 2018 ¹⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	IncrRisk - Significant	female aOR for ruptured AAA, 1.25; for AMI, 1.14; for stroke, 1.12; for aortic dissection, 1.19; for subarachnoid hemorrhage, 1.00; p < 0.05 for all except subarachnoid hemorrhage	1561940	NOT STAGE SPECIFIC	Stroke, Myocardial infarction, Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Waxman, 2018 ¹⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	Mixed (specify)	Range in aOR for age <65, 70-74, 75-79, 80-84, >84 (ref 65-69), 0.67 to 1.27 for ruptured abdominal aortic aneurysm, p < 0.05 for older age groups; 0.94 to 1.40 for acute MI, p NS for all; 0.89 to 1.38 for stroke, p < 0.05 for older age groups; 0.89 to 1.	1561940	NOT STAGE SPECIFIC	Stroke, Myocardial infarction, Aortic aneurysm and dissection	Dx Error
Waxman, 2018 ¹⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Health insurance	IncrRisk - Significant	Range in aOR for dually eligible Medicare and Medicaid, 1.23 to 1.40, p < 0.05 for all conditions	1561940	NOT STAGE SPECIFIC	Stroke, Myocardial infarction, Aortic aneurysm and dissection	Dx Error
Waxman, 2018 ¹⁷⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Ethnicity	Mixed (specify)	Range in aOR for Hispanic, 0.90 to 1.16	1561940	NOT STAGE SPECIFIC	Stroke, Myocardial infarction, Aortic aneurysm and dissection	Dx Error
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Community vs. tertiary sites	IncrRisk - Significant	Among patients in the sepsis-ICU group, the relative risk of missed diagnosis in community sites was 4.30 (2.15-8.60) compared with the tertiary site. In patients in the sepsis-VV group, the relative risk of a missed diagnosis in community sites was 14.0		NOT STAGE SPECIFIC	Sepsis	Dx Error
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Reported but not quantified					
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Triage intake severity	Reported but not quantified					
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Tests ordered	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	Reported but not quantified					
Scott, 2018 ¹⁷¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Atypical presentation	Reported but not quantified		1094			
Mattsson, 2018 ¹⁷²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - not sig	Women Total number of patients, n 654 Overall discrepancies, n (%) 135 (20.6) Clinically significant discrepancies, n (%) 36 (5.5) 0.911 P value (significant discrepancies) 0.911	1522	NOT STAGE SPECIFIC	Fractures	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mattsson, 2018 ¹⁷²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	65 and older Total number of patients, n 543 Overall discrepancies, n (%) 176 (32.4) Clinically significant discrepancies, n (%) 45 (8.3) P value (significant discrepancies) 0.002	1522	NOT STAGE SPECIFIC	Fractures	Either/Both
Drapkin, 2020 ¹⁷³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	WBC count	DecrRisk - not sig	14.4 vs 12.3 * 10**3/ μ L P = 0.115	1678	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Drapkin, 2020 ¹⁷³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	triage chief complaints nonspecific	IncrRisk - Significant	odds ratio, 2.46; 95% CI, 1.1–5.6	1678	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Drapkin, 2020 ¹⁷³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Drapkin, 2020 ¹⁷³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	Reported but not quantified					
Drapkin, 2020 ¹⁷³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	Reported but not quantified					
Drapkin, 2020 ¹⁷³	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Atypical presentation	Reported but not quantified					
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age of nurse	No effect - wide CI	OR 0.95 p > 0.05 for delay of electrocardiogram	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Years of emergency department experience for nurse	No effect - wide CI	OR = 0.77 p > 0.05 for delay of electrocardiogram	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	Mixed (specify)	For Caucasian vs. non-Caucasian, B = 0.24 p < 0.05 for length of delay in triage; OR = 2.12 p > 0.05 for delay of electrocardiogram	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	Mixed (specify)	B = 0.25 p < 0.05 for length of delay in triage; OR = 1.42 p > 0.05 for delay of electrocardiogram	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	X2(1) = 7.56 p = 0.006; more delay in No chest pain	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	No effect - wide CI	B for triage level 2 vs. triage level 3, 0.09, $p > 0.05$	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	B = -0.00, $p > 0.05$ for length of delay in triage; OR = 0.98 $p > 0.05$ for delay of electrocardiogram	283	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error
Sanders, 2017 ¹⁷⁴	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	IncrRisk - Significant	Years of experience for nurse, B = 0.03 $p < 0.001$ for length of delay in triage; OR = 1.10 $p = 0.038$ for delay of electrocardiogram	238	NOT STAGE SPECIFIC	Myocardial infarction	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Montmany, 2017 ¹⁷⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Trauma database Numerator: Numerator and denominator	Provider type/role	Mixed (specify)	Domain error Physician 142 errors at the US trauma center (106 deaths) 86% (122 errors) 51 errors at the Spanish referral hospital (21 deaths) 96% (49 errors) p: .06 Physician and nurse 142 errors at the US trauma center (106 deaths) 8% (12 errors) 51	106	ED Dx Process		Either/Both
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Provider type/role	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	SES/Income	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	14.7% misdiagnosis with SBP < 90mmHg; 40.8% misdiagnosed with SBP > 90 mmHg	261	Unclear or NR	Aortic aneurysm and dissection	Dx Error
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - not sig	43.3% of women misdiagnosed vs 29.9% of men	261	ED Dx Process	Aortic aneurysm and dissection	Dx Error
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Training background	IncrRisk - Significant	56.6% misdiagnosed by an internist; 25.7% by surgeon	261	ED Dx Process	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Language	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health insurance	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Disciplinary action	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health literacy	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Provider fatigue	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Clinical experience	Not reported					
Smidfelt, 2017 ¹⁸⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Ethnicity	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Chompoopong, 2017 ¹⁸²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	Reported but not quantified					
Chompoopong, 2017 ¹⁸²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	IncRisk - Significant					
Chompoopong, 2017 ¹⁸²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Atypical presentation	Reported but not quantified	41.6% of FN with non-neurologic diagnoses	273	ED Dx Process	Stroke	Dx Error
Chompoopong, 2017 ¹⁸²	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mode of arrival	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Podolnick, 2017 ¹⁸³	Study design: Cross-sectional Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Race	IncrRisk - notsig	White No DDI (N = 178), N (%) 97 (54.5) DDI (N = 18), (N = 196), N (%) 11 (61.1) Total (N = 196), N (%) 108 (55.1) 0.9163 African-American No DDI (N = 178), 49 (27.5) DDI (N = 18), N (%) 6 (33.3) Total (N = 196), N (%) 55 (28.1) Asian/Pacific Islander No		NOT STAGE SPECIFI C		
Podolnick, 2017 ¹⁸³	Study design: Cross-sectional Look back or look forward analysis: Not a cohort study Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - notsig	No DDI Age, months N 178 Mean 121.12 SD 55.35 Median 127 Range 1–225 DDI Age, months N 18 Mean 132.22 SD 62.27 Median 159 Range 30–199 P 0.3952	178	NOT STAGE SPECIFI C		Either/Bot h

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Antiemetic administered	IncrRisk - not sig	Unadjusted odds ratios and 95% confidence intervals of the risk of a 3-day clinically-important related revisit with an alternate diagnosis Antiemetic administered OR 3.13 (2.60,3.61)				
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	IncrRisk - Significant	Race or ethnic group, n (%) Abdominal radiograph performed (N = 185 439) Non-Hispanic white 82 797 (44.6) Non-Hispanic black 44 559 (24.0) Hispanic. 40 028 (21.6) Asian 2966 (1.6) Other 15 089 (8.1) Abdominal radiograph not performed (N = 96 786) No		NOT STAGE SPECIFIC		Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Analgesic administered	IncrRisk - Significant	Unadjusted odds ratios and 95% confidence intervals of the risk of a 3-day clinically-important related revisit with an alternate diagnosis Non-narcotic analgesic administered OR 2.38 (2.00,2.83) Narcotic analgesic administered OR 5.58 (4.41, 7.07)	28225		Other(Specify): Pediatric constipation	
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	IncrRisk - Significant	Male, n (%) Abdominal radiograph performed (N = 185 439) 89 324 (48.2) Abdominal radiograph not performed (N = 96 786) 45 331 (46.8) p-value <.001 unadjusted odds ratio of the risk of a 3 day clinically important related revisit with an alternative di		NOT STAGE SPECIFIC	Other (specify): Constipation	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	IncrRisk - Significant	Unadjusted odds ratios of 3 days clinically important related revisit with an alternative diagnosis, Abdominal / pelvic radiograph performed OR 1.98 (1.66, 2.35) Abdominal/pelvic ultrasound performed OR 1.22 (0.94, 1.59) CRP/ESR performed OR 1.86 (1.47,	282225	NOT STAGE SPECIFIC	Other(Specify): Pediatric constipation	
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	Only for 3 day revisit with clinically important related revisit with an alternative diagnosis Age < 1 OR 0.40 (0.30, 0.54)		NOT STAGE SPECIFIC	Other (specify): Constipation	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Freedman, 2017 ¹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health insurance	DecrRisk - Significant	Payer, n (%) Abdominal radiograph performed (N = 185 439) Government 101 075 (55.2) Private 60 135 (32.8) Other 22 030 (12.0) Abdominal radiograph not performed (N = 96 786) Government 64 456 (67.3) Private 21 451 (22.4) Other 9826 (10.3) p-value <.00		NOT STAGE SPECIFIC		Either/Both
Bayne, 2017 ¹⁸⁴	Study design: Case-control Look back or look forward analysis: Look back method (disease denominator) Data source: Previous study Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Isolated scrotal pain was more common in those correctly diagnosed in the acute setting than those initially misdiagnosed (71.1% vs 41.6%; P = .051). Nausea and vomiting were reported by a smaller proportion of misdiagnosed patients than those presenting	218	NOT STAGE SPECIFIC	Testicular torsion	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Bayne, 2017 ¹⁸⁴	Study design: Case-control Look back or look forward analysis: Look back method (disease denominator) Data source: Previous study Numerator: Numerator and denominator	Age	IncrRisk - Significant	Misdiagnosed patients were younger and weighed less than those correctly diagnosed in the acute setting (9.9 vs 12.9 years; P = .006; 42.6 vs 59.2 kg; P = .01).	12	NOT STAGE SPECIFIC	Testicular torsion	Either/Both
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Geographic region	Reported but not quantified					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	ED volume/annual visits	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Arrival within 5 hours	DecrRisk - Significant	46% no tx	136	Patient interval	Stroke	Dx Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Ownership/business model	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Delivery/pay ment method	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Race	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	ED visit not complete	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	SES/Income	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Sex	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	ED staffing	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Symptom type	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Teaching status	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Access to testing	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Tests ordered	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Triage intake severity	DecrRisk - Significant	NIHSS<10 - 88% no tx, NIHSS>20 - 52% tx	192	Unclear or NR	Stroke	Dx Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Inpatient occupancy rate	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Current discharge fraction	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Health insurance	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Language	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Mode of arrival	IncrRisk - Significant	69% no tx	67	Unclear or NR	Stroke	Dx Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Atypical presentation	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	ED crowding	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Age	No effect - wide CI	mean age for tx (TP) is 67.8 and mean age for no tx (FP) is 66.8	192	NOT STAGE SPECIFIC	Stroke	Dx Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Population density	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Average discharge fraction	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Health literacy	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Access to consultation	No effect - wide CI	56% with no tx	94	ED Dx Process	Stroke	Dx Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Off hours	DecrRisk - not sig	48% no tx	69	ED Dx Process	Stroke	Dx Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Handoffs	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Ethnicity	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	Access to Electronic Health Record/Elect ronic Health Record type	Not reported					
Yi, 2017 ¹⁸⁵	Study design: Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Unclear or NR	ED illness severity	Not reported					
Kondis, 2017 ¹⁸⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Training background	IncrRisk - not sig	Thirty-nine percent were evaluated by a pediatric emergency medicine-trained physician during their initial fussy visit, whereas 78% were evaluated by pediatric emergency medicine trained physician during their subsequent visit	279	ED Dx Process	Fractures	Either/Bot h

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Kondis, 2017 ¹⁸⁶	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - not sig	Fifteen (83%) of 18 infants were 3 months or younger at the time of the fussy visit	18	NOT STAGE SPECIFIC	Fractures	Either/Both
Kamal, 2017 ¹⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator	lab/vitals at admission	IncrRisk - Significant	Median Glucose 120 vs 118, median SBP 158 vs 154; p <0.0001 in delayed vs <= 60 min DTN	55296	ED Dx Process	Stroke	Dx Error
Kamal, 2017 ¹⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator	Race	IncrRisk - Significant	Black : 16.54% vs 14.65% in delayed vs <= 60 min DTN p <0.0001	55296	NOT STAGE SPECIFIC	Stroke	Dx Error
Kamal, 2017 ¹⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator	Sex	IncrRisk - Significant	female 52.13% vs 47.68%, p<0.0001, in delayed vs <= 60 min DTN	55296	NOT STAGE SPECIFIC	Stroke	Dx Error
Kamal, 2017 ¹⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator	Triage intake severity	DecrRisk - Significant	NIHSS score 10(6-10) vs 9 (5-16) p <0.0001	55296	ED Dx Process	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Kamal, 2017 ¹⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator	Health insurance	Mixed (specify)	self pay/no 6.55 % vs 6.53%; medicare 37.20% vs 37.44%; medicaid 10.77% vs 9.77%; private/VA/other 44.8% vs 45.6%, in in delayed vs =< 60 min DTN; p 0.0007	55296	NOT STAGE SPECIFIC	Stroke	Dx Error
Kamal, 2017 ¹⁸⁷	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Multiple Numerator: Numerator and denominator	Mode of arrival	IncrRisk - Significant	Private 20.95% vs 22.24%; EMS 78.51% vs 85.54% in delayed vs =< 60 min DTN p< 0.0001	55296	Pre-hospital interval	Stroke	Dx Error
Moonen, 2017 ¹⁸⁸	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant	There was a significant statistical difference in age (44 vs. 34, p < 0.005) presentation of our population in comparison to overall minor trauma patients.		NOT STAGE SPECIFIC	Fractures	Either/Both
Nevo, 2017 ¹⁸⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	clinic visit prior	IncrRisk - Significant	increased delay (48% p=0.008) if patient went to clinic before coming to the ed and also increased missed diagnosis. (50%, p= 0.02)				

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Nevo, 2017 ¹⁸⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Median duration of pain (IQR) Median age (IQR) Correct Diagnosis 5 (2-12) Missed Diagnosis 60 (30-72) Delayed Presentation 48 (15-69)		NOT STAGE SPECIFIC	Testicular torsion	Either/Both
Nevo, 2017 ¹⁸⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	Mixed (specify)	Median age (IQR) Correct Diagnosis 13 (10-15) Missed Diagnosis 12 (3-14) Delayed Presentation 11 (2-13)		NOT STAGE SPECIFIC		Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Nevo, 2017 ¹⁸⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Off hours	Mixed (specify)	Time ultrasound was performed Morning Correct Diagnosis 21 (58%) Missed Diagnosis 6 (60%) Delayed Presentation 12 (52%) Evening Correct Diagnosis 8 (21%) Missed Diagnosis 3 (30%) Delayed Presentation 8 (35%) Night Correct Diagnosis 8 (21%) Mi		ED Dx Process	Testicular torsion	Either/Both
Calic, 2016 ¹⁹⁵	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	IncrRisk - Significant	OR 2.3, 95% CI 1.01–5.5, p = 0.046		NOT STAGE SPECIFIC	Stroke	
Calic, 2016 ¹⁹⁵	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Mode of arrival	DecrRisk - not sig			Pre-hospital interval	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Calic, 2016 ¹⁹⁵	Study design: Prospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Atypical presentation	IncrRisk - Significant	(OR 3.5, 95% CI 1.5–8.0, p = 0.003)	225	NOT STAGE SPECIFIC	Stroke	
Chen, 2016 ¹⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Reported but not quantified	Of the male patients who had appendectomy (113), 90.3% had true appendicitis while 9.7% had a normal appendix. In comparison, of the female patients who had an appendectomy (136), only 61% had appendicitis and 39% had a normal appendix.	249	NOT STAGE SPECIFIC	Appendicitis	Dx Error
Chen, 2016 ¹⁹⁷	Study design: Retrospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	Not reported					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Hillinger, 2017 ¹⁹⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator only (error/harm)	Sex	No effect - narrow CI	A significant difference in early diagnostic uncertainty was observed between younger women and younger men. Women aged 54 years or younger had an AUC of 0.96 (95 % CI 0.93–0.99) compared to an AUC of 0.87 in younger men (95 % CI 0.84–0.91, p<0.001,		ED Dx Process	Myocardial infarction	
Hillinger, 2017 ¹⁹⁹	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Prospective data collection Numerator: Numerator only (error/harm)	Age	Reported but not quantified					
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Race	No effect - wide CI	black 22.6% vs 21.3%, 0.63, in missed vs diagnosed stroke	2027	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Sex	No effect - wide CI	female 56.5% vs 55.1%, p 0.65, in missed vs diagnosed stroke	2027	NOT STAGE SPECIFIC	Stroke	Dx Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Symptom type	Mixed (specify)	Those presenting with focal weakness were 62% less likely to have missed ED AIS diagnoses (95% CI = 0.31 to 0.48). The only symptom that was associated with an increase in the likelihood of missed ED diagnosis of AIS was decreased LOC; those with a decrease	2027	ED Dx Process	Stroke	Dx Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Tests ordered	DecrRisk - Significant	Brain imaging completed in ED 83.8% vs 97.4%, p<0.0001 in missed vs diagnosed stroke	2027	ED Dx Process	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Age	DecrRisk - not sig	aOR = 0.99, 95% CI = 0.98 to 1.0 for each 1-year increase	2027	ED Dx Process	Stroke	Dx Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Atypical presentation	IncrRisk - Significant	symptoms other than focal weakness, focal numbness, LOC, speech, headache, vision, dizziness/vertigo: 60.1% vs 51.4%, p0.007, in missed vs diagnosed stroke	2027	ED Dx Process	Stroke	Dx Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	Mode of arrival	IncrRisk - Significant	by EMS: 67% vs 53.9%, p <0.0001, in missed vs diagnosed stroke	2027	Pre-hospital interval	Stroke	Dx Error
Madsen, 2016 ²⁰⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: The Greater Cincinnati /Northern Kentucky Stroke Study (GCNKSS) Numerator: Numerator and denominator	ED crowding	No effect - wide CI	arrival during peak hours: 63.5% vs 64.5%, p 0.77, in missed vs diagnosed stroke	2027	ED Dx Process	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Sex	Not reported					
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Symptom type	No effect - wide CI	Childhood arterial ischemic stroke/TIA: conscious state, focal symptoms, and signs on arrival were not associated with the type of first imaging or time to diagnostic MRI	90	Stroke		
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Off hours	No effect - wide CI					
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Triage intake severity	Reported but not quantified					

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Age	No effect - wide CI					
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Atypical presentation	Not reported					
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Mode of arrival	Reported but not quantified					
Daverio, 2016 ²⁰¹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	ED illness severity	No effect - wide CI					
Gaither, 2016 ²⁰²	Study design: Case series Look back or look forward analysis: Unsure Data source: Malpractice claims Numerator: Numerator only (error/harm)	Symptom type	DecrRisk - not sig	Abdominal pain initial symptoms 0.44 (0.13-1.44) p: 0.17	53	ED Dx Process	Testicular torsion	Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Gaither, 2016 ²⁰²	Study design: Case series Look back or look forward analysis: Unsure Data source: Malpractice claims Numerator: Numerator only (error/harm)	Tests ordered	DecrRisk - not sig	US on first presentation 0.99 (0.33-2.95) p: 0.99 CT on first presentation 0.5 (0.08-3.00) p: 0.45		ED Dx Process	Testicular torsion	Either/Both
Gaither, 2016 ²⁰²	Study design: Case series Look back or look forward analysis: Unsure Data source: Malpractice claims Numerator: Numerator only (error/harm)	Age	DecrRisk - not sig	Univariate OR (95% CI for OR) 0.99 (0.91-1.09) p .90		NOT STAGE SPECIFIC	Testicular torsion	Either/Both
Aaronson, 2016 ²⁰⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Sex	Mixed (specify)	However sex, insurance status, pain scale at presentation, ED occupancy, and admission to ED observation did not make them more or less likely to return within 72 hours Male, n (%) <72 hours n=14770 (47.6) >72 hours n=857408 (47.6) p-value: 1	1022	NOT STAGE SPECIFIC		Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Aaronson, 2016 ²⁰⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Health insurance	Mixed (specify)	However sex, insurance status, pain scale at presentation, ED occupancy, and admission to ED observation did not make them more or less likely to return within 72 hours Private insurance, n (%) <72 hours n=147 78 (53.1) >72 hours n=857 402 (46.9) p-	1022	NOT STAGE SPECIFIC	Other (specify)	Either/Both
Aaronson, 2016 ²⁰⁴	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Billing/administrative coded diagnoses Numerator: Numerator and denominator	Age	DecrRisk - Significant	<72 hours n=147 Mean age: 40.8 >72 hours n=857 Mean age: 47.5 p:0.005 Patients who returned within 72 hours were more likely to be younger (mean age, 40.8 vs 47.5; p = 0.005)	1022	NOT STAGE SPECIFIC		Either/Both

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	smoking, illicit drug use, heavy alcohol use	No effect - wide CI		465	NOT STAGE SPECIFIC	Stroke	Dx Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Code in ED	DecrRisk - Significant	8% vs 46% in missed vs not missed stroke (p<0.001)	465	ED Dx Process	Stroke	Dx Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - wide CI	White 67% vs 72% (0.341) in missed vs not missed stroke	465	NOT STAGE SPECIFIC	Stroke	Dx Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	posterior stroke	IncrRisk - Significant	Posterior vs anterior stroke misdiagnosis rate: 37% vs 16% (P<0.001)	465	NOT STAGE SPECIFIC	Stroke	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	Female 48% vs 56% (p 0.114) in missed vs not missed stroke	465	NOT STAGE SPECIFIC	Stroke	Dx Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	IncrRisk - Significant	nausea/vomiting (odds ratio [OR], 4.02; 95% confidence interval [CI], 1.60–10.1), dizziness (OR, 1.99; 95% CI, 1.03–3.84)	465	ED Dx Process	Stroke	Dx Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	No effect - wide CI	Mfean 71.5 vs 72.6 in missed vs not missed stroke; p 0.543	465	NOT STAGE SPECIFIC	Stroke	Dx Error
Arch, 2016 ²⁰⁵	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Atypical presentation	Not reported					
Vagnarelli, 2016 ²⁰⁶	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Unclear or NR	Tests ordered	IncrRisk - Significant	Troponin positivity (vs. negative Tn +Tn unavailable) 1.87 (1.07–3.26) 0.026	398	ED Dx Process	Aortic aneurysm and dissection	Dx Error

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Vagnarelli, 2016 ²⁰⁶	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Unclear or NR	Symptom type	IncrRisk - Significant	Dyspnea 2.65 (1.48–4.74) Pulse deficit 0.51 (0.28–0.95) Back pain 0.48 (0.31–0.77) 0.002 Pleural effusion 2.01 (1.28–3.43) 0.003 Pericardial effusion 1.72 (1.07–2.77) 0.02	398	NOT STAGE SPECIFIC	Aortic aneurysm and dissection	Dx Error
Vagnarelli, 2016 ²⁰⁶	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Unclear or NR	Triage intake severity	Not reported					
Vagnarelli, 2016 ²⁰⁶	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Unclear or NR	Mode of arrival	Not reported					
Vagnarelli, 2016 ²⁰⁶	Study design: Registry Look back or look forward analysis: Look back method (disease denominator) Data source: Unclear or NR Numerator: Unclear or NR	Atypical presentation	Not reported					
Metcalfe, 2016 ²⁰⁷	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Symptom type	DecrRisk - Significant	Association with correct diagnosis: palpable AAA (odds ratio 3.3, 95% CI 1.1–9.4, P= 0.029) and collapse (odds ratio 3.2, 95% CI 1.0–10.0, P= 0.042)	85	ED Dx Process	Aortic aneurysm and dissection	

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Copson, 2020 ²⁰⁹	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator only (error/harm)	Specialist vs. General	Reported but not quantified			NOT STAGE SPECIFIC	Appendicitis	Unclear or NR
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	SES/Income	No effect - wide CI				Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Race	No effect - wide CI				Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI				Stroke	

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Tests ordered	DecrRisk - not sig	Neurologic consult and neuroimaging at index visit for headache was more frequent in patient with subsequent TIA	186		Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Triage intake severity	Not reported				Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Language	No effect - wide CI				Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - not sig				Stroke	

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health insurance	Not reported				Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Health literacy	Not reported				Stroke	
Liberman, 2020 ²¹⁰	Study design: Retrospective cohort Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Ethnicity	No effect - wide CI				Stroke	
Gurley, 2018 ²¹¹	Study design: Case series Look back or look forward analysis: Not a cohort study Data source: Malpractice claims Numerator: Numerator only (error/harm)	Clinical experience	Mixed (specify)	May be some increased effect for cardiac cases: Cardiac related 21 (18.6) 71 (10.0) <0.005* but otherwise no significant effect				

Author, Year	Study Design Characteristics	Factor	Effect	Magnitude	SS	Stage	Conditions	Error
Mirete, 2005 ²¹²	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Sex	No effect - wide CI	Sex Male Woman Group C (N104) Male 73 (70.2%) Female 31 (29.8%) Group A+B (n=424) Male 238 (56.2%) Female 186 (43.8%) p = 0.06; OR = 1.52 95% CI, 0.98-2.38				Dx Error
Mirete, 2005 ²¹²	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Age	IncrRisk - Significant			NOT STAGE SPECIFIC		Dx Error
Mirete, 2005 ²¹²	Study design: Cross-sectional Look back or look forward analysis: Look back method (disease denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Off hours	No effect - wide CI					Dx Error
Geyer, 2013 ²¹⁴	Study design: Prospective cohort Look back or look forward analysis: Look forward method (symptom/presentation denominator) Data source: Electronic health record data Numerator: Numerator and denominator	Mean Injury Severity score	Reported but not quantified	The mean ISS was 25.8 (+ 17.0 SD)			Other (specify): trauma	

AAD: Aortic aneurysm and dissection; aOR: Adjusted odds ratio; CI: Confidence Interval; DecrRisk: Decreased Risk; Dx Error: Diagnostic Error; ED: Emergency Department; IncrRisk: Increased Risk; ISS: Injury Severity Score; NA: Not applicable; OR: Odds Ratio; STEMI: ST-elevated myocardial infarction; VTE: Venous thromboembolism

Table D-5. Risk of bias of studies that evaluated diagnostic errors in the emergency department

Author, Year	Risk of Bias in Patient Selection	Risk of Bias in Index Test	Risk of Bias in Reference Standard	Risk of Bias in Flow and Timing	Applicability of Patient Selection	Applicability of Index Test	Applicability of Reference Standard
Aaronson, 2016 ²⁰⁴	Low	Low	Low	High	Low	Low	Low
Aaronson, 2018 ¹⁷⁷	High	Low	Low	Low	Low	Low	Low
Agrawal, 2019 ¹⁵⁷	Low	Low	Low	Low	Low	Low	Low
Aneiros, 2019 ¹⁴⁶	Low	Low	Low	Low	Low	Low	Low
Atzema, 2011 ⁵²	Low	Low	Low	Low	Low	Low	Low
Augustin, 2011 ⁵⁴	Low	Low	Low	Low	Low	Low	Low
Beaver, 2005 ¹⁰⁷	Low	Low	Low	Low	Low	Low	Low
Breen, 2017 ¹⁷⁹	High	Low	Low	Low	Low	Low	Low
Calder, 2010 ⁵⁸	Low	Low	Low	Unclear	Low	Unclear	Low
Carlton, 2015 ⁶⁹	Unclear	Low	Low	Low	Low	Low	Low
Catapano, 2017 ¹⁷⁶	Low	Low	High	Low	Low	Low	High
Caterino, 2012 ²¹	Low	Low	Low	Unclear	Low	Low	Low
Chan, 2019 ¹⁵⁰	Low	Low	Low	Low	Low	Low	Low
Chan, 2020 ¹²⁵	Low	Low	Low	Low	Low	Low	Low
Chang, 2019 ¹⁶⁹	Low	Low	Low	Low	Low	Low	Low
Chen, 2016 ¹⁹⁷	Low	Low	Low	Low	Low	Low	Low
Cheong, 2014 ³⁴	Low	Low	Low	Low	Low	Low	Low
Chompoopong, 2017 ¹⁸²	Low	Low	Low	Low	Low	Low	Low
Chu, 2015 ⁷³	Low	Low	Low	Low	Low	Low	Low
Chung, 2009 ²²	Unclear	Low	Low	Low	Low	Low	Low
Cifra, 2020 ¹³⁰	Low	Low	High	Low	Low	Low	High
Conti, 2003 ¹¹²	Low	Low	Low	Low	Low	Low	Low
Copson, 2020 ²⁰⁹	Low	Unclear	Unclear	Unclear	Low	Unclear	Unclear
Corral Gudino, 2003 ¹¹¹	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
Crosby, 2013 ¹⁶	Low	Low	Low	Low	Low	Low	Low
Degheim, 2019 ¹⁴⁹	Low	Low	High	High	Low	Low	High
Drapkin, 2020 ¹⁷³	Low	Low	Low	Low	Low	Low	Low
Dubosh, 2015 ¹¹	Low	Low	Low	Low	Low	Low	Low
Dubosh, 2019 ¹⁵⁴	High	Low	Low	Low	Low	Low	Low
England, 2006 ¹⁰⁰	Low	Low	Low	Low	Low	Low	Low
Faiz, 2014 ³⁰	Low	Low	Unclear	High	Low	Low	Low
Fasen, 2020 ¹³¹	Low	Low	Low	Low	Low	Low	Low
Fernholm, 2019 ¹⁴⁵	High	Unclear	Unclear	Unclear	High	Unclear	Unclear

Author, Year	Risk of Bias in Patient Selection	Risk of Bias in Index Test	Risk of Bias in Reference Standard	Risk of Bias in Flow and Timing	Applicability of Patient Selection	Applicability of Index Test	Applicability of Reference Standard
Ferree, 2016 ¹	Low	Low	Low	Low	Low	Low	Low
Filippi, 2008 ²³	Low	Low	Low	Low	Low	Low	Low
Freedman, 2014 ³⁷	Low	Unclear	Unclear	Low	Low	Low	Unclear
Gallagher, 2006 ¹³	Unclear	Low	Low	Low	Low	Low	Low
Garfield, 2004 ¹⁰⁸	Low	Low	Low	Low	Low	Low	Low
Gargano, 2009 ⁸³	Low	Low	Low	Low	Low	Low	Low
Gaughan, 2009 ⁸²	Low	Low	Unclear	Low	Low	Low	Unclear
Gergenti, 2019 ¹⁵³	Low	Unclear	Unclear	Unclear	Low	Low	Low
Gold, 2020 ¹¹⁹	Low	Unclear	Unclear	Unclear	Low	Unclear	Unclear
Gouin, 2006 ¹⁰³	Low	High	High	High	Low	Low	Low
Goulet, 2015 ⁷⁰	Low	Low	Low	Low	Low	Low	Unclear
Goyal, 2020 ¹¹⁶	Low	Low	Low	Low	Low	Low	Low
Graff, 2006 ⁹⁹	Low	Unclear	Low	Low	Low	Low	Low
Graff, 2014 ²⁹	Low	Low	Low	Low	Low	Low	Low
Groot, 2016 ⁷¹	Low	Low	Low	Low	Low	Low	Low
Grosmaître, 2013 ³⁶	Low	Low	Low	Low	Low	Low	Low
Guillan, 2012 ⁴³	Low	Low	Low	Low	Low	Low	Low
Gurley, 2018 ²¹¹	Low	Unclear	Unclear	Unclear	Low	Unclear	Unclear
Hallas, 2006 ¹⁰²	Low	Low	High	Low	Low	Low	Low
Hansen, 2007 ⁹⁴	Low	Low	Low	Low	Low	Low	Low
Harbison, 2003 ¹¹³	Low	Low	Unclear	Low	Low	Low	Low
Harris, 2011 ⁴⁹	Low	Low	Low	Low	Low	Low	Low
Hautz, 2019 ¹⁴⁸	Low	Low	High	Low	Low	Low	Low
Heckmann, 2004 ¹¹⁰	Low	Low	Low	Low	Low	Low	Low
Hendriks, 2015 ⁶³	Low	Low	Low	Low	Low	Low	Low
Hochberg, 2011 ⁴⁷	Low	Low	Low	Low	Low	Low	Low
Hoekstra, 2009 ⁷⁸	Low	Low	High	Low	Low	Low	High
Holland, 2015 ⁷²	Low	Low	Unclear	Low	Low	Low	Low
Huang, 2019 ¹⁵⁶	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
Husabø, 2020 ¹³³	Low	Low	Unclear	Low	Low	Low	Unclear
Hussain, 2019 ¹³⁵	High	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
Jiménez Castro, 2007 ⁹³	Low	Low	Low	Low	Low	Low	Low
Kargl, 2019 ¹⁵⁸	Low	Low	Low	Low	Low	Low	Low
Kerkman, 2020 ¹²⁴	Low	Low	Low	Low	Low	Low	Low

Author, Year	Risk of Bias in Patient Selection	Risk of Bias in Index Test	Risk of Bias in Reference Standard	Risk of Bias in Flow and Timing	Applicability of Patient Selection	Applicability of Index Test	Applicability of Reference Standard
Kim, 2007 ⁹⁰	Low	Low	Low	Low	Low	Low	Low
Kline, 2007 ⁹²	High	Low	Low	Low	Low	Low	Low
Kline, 2009 ²⁰	Low	Low	Low	Low	Low	Low	Low
Kornblith, 2013 ⁷	Low	Low	Low	Low	Low	Low	Low
Kuruvilla, 2011 ⁶⁰	Low	Low	Low	Low	Low	Low	Low
Leeuwenburgh, 2014 ²⁵	Low	Low	Low	Low	Low	Low	Low
Lever, 2013 ⁴⁴	Low	Low	Low	Low	Low	Low	Low
Liberman, 2018 ¹⁶⁸	Low	Low	Low	Low	Low	Low	Low
Liberman, 2019 ¹⁴⁴	Low	Low	Low	Low	Low	Low	Low
Liberman, 2020 ¹²⁷	Low	Low	Low	Low	Low	Low	Low
Liberman, 2020 ¹¹⁴	Low	Low	Low	High	Low	Low	Low
Lindsey, 2018 ¹⁶¹	Low	Low	Low	Low	Low	Low	Low
Mahajan, 2020 ¹³²	Low	Low	Low	Low	Low	Low	Low
Mahajan, 2020 ¹³⁴	Low	Unclear	Low	Low	Low	Low	Low
Mansella, 2020 ¹²¹	Low	Low	Low	Low	Low	Low	Low
March, 2014 ²⁷	High	Low	Low	Low	High	Low	Low
Martin, 2011 ⁴⁸	Unclear	Low	High	Low	Low	Low	Low
Mattijssen-Horstink, 2020 ¹²⁶	Low	Low	High	Low	Low	Low	Low
Mattsson, 2018 ¹⁷²	Low	Low	Low	Low	Low	Low	Low
McGann Donlan, 2009 ⁸⁰	Low	Low	Low	Low	Low	Low	Low
Medford-Davis, 2016 ⁶⁶	High	Unclear	Unclear	Unclear	High	Unclear	Unclear
Michelson, 2019 ¹³⁷	Low	Low	Low	Low	Low	Low	Low
Miedema, 2011 ⁵¹	Low	Low	Low	Low	Low	Low	Low
Miller, 2018 ¹²	Low	Low	Low	Low	Low	Low	Low
Moeller, 2008 ¹⁰	Low	Low	Unclear	Low	Low	Low	Low
Mohamed, 2013 ⁴²	Low	Low	Unclear	Low	Low	Low	Unclear
Montmany, 2008 ⁵	Low	Low	Low	Low	Low	Low	Low
Montmany, 2017 ¹⁷⁵	Low	Low	High	Low	Low	Low	Low
Moy, 2015 ²⁴	Low	Low	Low	Low	Low	Low	Low
Muhm, 2012 ³	Low	Low	Low	Low	Low	Low	Low
Musunuru, 2007 ⁹¹	Low	Low	Low	Low	Low	Low	Low
Naiditch, 2013 ³⁹	Low	Low	Low	Low	Low	Low	Low

Author, Year	Risk of Bias in Patient Selection	Risk of Bias in Index Test	Risk of Bias in Reference Standard	Risk of Bias in Flow and Timing	Applicability of Patient Selection	Applicability of Index Test	Applicability of Reference Standard
Newman-Toker, 2014 ³³	Low	Low	Low	Low	Low	Low	Low
Nuñez, 2006 ¹⁰¹	High	Low	High	High	Low	Low	Low
Ohle, 2019 ¹⁵¹	Low	Low	Low	Low	Low	Low	Low
Ois, 2019 ¹³⁸	Low	Low	High	Low	Low	Low	Low
Okafor, 2016 ⁶⁵	High	Unclear	Unclear	Unclear	High	Unclear	Unclear
Oliver, 2019 ¹⁴³	Low	Low	High	Low	Low	Low	High
Osterwalder, 2020 ¹⁴	Low	Low	Low	Low	Low	Low	Low
Palomeras Soler, 2015 ³²	High	Low	High	High	High	Low	High
Pare, 2016 ⁶²	Unclear	Low	Low	Low	Low	Low	Low
Parikh, 2008 ⁸⁹	Low	Low	Low	Low	Low	Low	Low
Pehle, 2006 ⁹⁸	Low	Low	Low	Low	Low	Low	Low
Peng, 2015 ²⁶	Low	Low	Low	Low	Low	Low	Low
Pihlasviita, 2018 ¹⁶⁴	Low	Low	Low	Low	Low	Low	Low
Piper, 2008 ⁸⁸	Low	Low	Low	Low	Low	Low	Low
Pirozzi, 2014 ¹⁹	Low	Low	Low	Low	Low	Low	Low
Postma, 2012 ⁴	Low	Low	Low	Unclear	Low	Low	Unclear
Prabhakaran, 2008 ⁸⁶	Low	Low	Low	Low	Low	Low	Low
Rapezzi, 2008 ⁸⁵	Low	Low	Low	Low	Low	Low	Low
Raposo, 2018 ¹⁵⁹	Low	Low	Low	Low	Low	High	Low
Ravichandiran, 2010 ⁷⁶	Unclear	Low	High	Low	Low	High	Low
Rav. 2006 ¹⁸	Low	Low	Low	Low	Low	Low	Low
Rønning, 2005 ¹⁰⁶	Low	Low	Low	Low	Low	Low	Low
Rose, 2008 ⁸⁷	Low	Low	Unclear	Low	Low	Low	Unclear
Royl, 2011 ⁹	High	Low	Low	Unclear	High	Low	Unclear
Russell, 2013 ⁴⁰	Low	Low	Low	Low	Low	Low	Low
Saaristo, 2020 ¹⁵	Low	Low	High	Low	Low	Low	Low
Sadiqihi, 2019 ¹⁴⁷	Low	Low	Low	Low	Low	Low	Low
Sanders, 2017 ¹⁷⁴	High	Low	Low	Low	High	Low	Low
Santos, 2009 ⁷⁷	Unclear	Low	High	High	Low	Low	Low
Sarraj, 2015 ⁴¹	Low	Low	Low	Low	Low	Low	Low
Scheuermeyer, 2012 ⁴⁶	Low	Low	Low	Low	Low	Low	Low
Schrock, 2012 ⁵³	Low	Low	Low	Low	Low	Low	Low

Author, Year	Risk of Bias in Patient Selection	Risk of Bias in Index Test	Risk of Bias in Reference Standard	Risk of Bias in Flow and Timing	Applicability of Patient Selection	Applicability of Index Test	Applicability of Reference Standard
Schull, 2006 ⁹⁷	Low	Low	Low	Low	Low	Low	Low
Scott, 2018 ¹⁷¹	Low	Low	Low	Low	Low	Low	Low
Sederholm Lawesson, 2018 ¹⁶⁷	Low	Low	Low	Low	Low	Low	Low
Seetahal, 2011 ⁵⁶	Low	Low	Low	Low	Low	Low	Low
Settelmeier, 2020 ¹¹⁸	Low	Low	High	Low	Low	Low	Low
Sharif, 2018 ¹⁶⁶	Low	Low	Low	Low	Low	Low	Low
Sharp, 2020 ¹²⁰	Low	Low	Low	Low	Low	Low	Low
Smidfelt, 2017 ¹⁸⁰	High	Low	Low	Low	High	Low	Low
Smidfelt, 2020 ¹²²	Low	Low	Low	Low	Low	Low	Low
Smith, 2012 ⁵⁰	High	Low	Low	Low	High	Low	Low
Snoek, 2013 ²	Low	Low	Low	Low	Low	Low	Low
Soundappan, 2004 ¹⁰⁹	Low	Low	High	Low	Low	Low	Low
Sporer, 2013 ⁴⁵	Unclear	Low	Low	Low	Unclear	Low	Low
Sun, 2007 ⁸	Low	Low	Low	Low	Low	Low	Low
Sundberg, 2018 ¹⁶⁵	Low	Low	Low	Low	Low	Low	Low
Torres-Macho, 2013 ³⁸	Low	Low	Low	Low	Low	Low	Low
Tsivgoulis, 2011 ⁵⁵	Low	Low	Low	Low	Low	Low	Low
Tudela, 2005 ¹⁰⁵	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
Tzovaras, 2007 ⁹⁶	Low	Low	Low	Low	Low	Low	Low
van Noord, 2010 ⁶¹	Low	Unclear	Unclear	Unclear	Low	Unclear	Unclear
Vanbrabant, 2009 ⁷⁵	Low	Low	Low	Low	Low	Low	Low
Vasconcelos-Castro, 2020 ¹⁴⁰	Low	Unclear	Unclear	Low	Low	Low	Low
Venkat, 2018 ¹⁶²	High	Low	Low	Low	Low	Low	Low
Vermeulen, 2007 ⁹⁵	Low	Low	Unclear	Unclear	Low	Low	Unclear
Vinz, 2015 ⁶⁴	Low	High	High	Low	Low	Low	Low
Waxman, 2018 ¹⁷⁰	Low	Low	Low	Low	Low	Low	Low
Weinberg, 2010 ⁷⁴	Unclear	Low	Low	Low	Unclear	Low	Low
Williams, 2009 ⁸¹	Low	Low	Low	Low	Low	Low	Unclear
Williams, 2019 ¹⁵²	Low	Low	High	High	Low	Low	Low
Willner, 2012 ⁶	Low	Low	Low	High	Low	Low	Low
Wilson, 2014 ²⁸	Low	Low	Unclear	Low	Low	Low	Low
Winkler, 2009 ⁸⁴	Low	Low	Low	Low	Low	High	Low

Author, Year	Risk of Bias in Patient Selection	Risk of Bias in Index Test	Risk of Bias in Reference Standard	Risk of Bias in Flow and Timing	Applicability of Patient Selection	Applicability of Index Test	Applicability of Reference Standard
Wireklint Sundström, 2015 ⁶⁸	Low	Low	Unclear	Low	Low	Low	Low
Yeboah, 2019 ¹⁶⁰	Low	Low	Unclear	Low	Low	Low	Unclear
York, 2005 ¹⁰⁴	Low	Low	Low	Low	Low	Low	Low
Zaschke, 2020 ¹²⁸	Low	Low	Low	Low	Low	Low	Low

Table D-6. Strength of evidence of studies that evaluate the overall diagnostic error rates, misdiagnosis-related harms, and mortality from diagnostic errors in the emergency department

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
Overall diagnostic errors	1 Prospective cohort ^{58, 148} of ED admissions (755) 1 Prospective cohort with matched controls of ED discharges ¹⁰¹ (500)	Low*	Direct	Consistent	Precise	Undetected	Moderate*	Weighted mean DE rate was 5.6%. As expected, DE rates were lowest for discharges that did not return within 72hrs (4%), higher for those admitted (12.3%), and highest for those discharged who did return within 72hrs (20%).
Misdiagnosis-related harms	1 Prospective cohort ^{58, 148} 4 Retrospective cohort ^{75, 177, 194, 215} (436,861)	Low* (prospective) High* (retrospective)	Direct	Consistent†	Precise	Undetected	Moderate*	The prospectively-determined diagnostic adverse event rate (misdiagnosis-related harms) was 2.0% (95% CI 1.0-3.6). Retrospectively determined rates were roughly two orders of magnitude lower (weighted mean 0.02%).
Mortality from diagnostic errors	2 Prospective cohorts ^{58, 148} (1258) 3 Retrospective cohorts ^{75, 177, 215} (436,173)	Low* (prospective) High* (retrospective)	Direct	Consistent†	Imprecise	Undetected	Moderate*‡	The prospectively-determined misdiagnosis-related mortality was 0.20 to 0.25%. Retrospectively determined rates were more than 200-fold lower (weighted mean 0.0009%).

CI = confidence interval; DE = diagnostic error; ED = emergency department

* The prospective studies on which the main study results rest for the overall diagnostic error/harm rates (Key Question 2a) had low concerns related to design and risk of bias. Despite different study populations, they had similar diagnostic error definitions. Retrospective studies provided evidence of harms and mortality, but there was strong evidence that these systematically under-ascertained the outcome events of interest, so they were not included as part of the final estimates related to error/harm rates (nor did they count against the overall strength of evidence for estimates derived from the prospective studies). Because there were just three prospective studies (and therefore imperfect generalizability, despite overall consistency and coherence of the results), we rated the evidence supporting these estimates as moderate, rather than high.

† Inconsistency in misdiagnosis-related harm results was principally between the well-designed, prospective studies with systematic follow-up and the four retrospective cohort studies that relied on outcome triggers for ascertainment. Systematic under-ascertainment in retrospective studies was most clearly demonstrated based on two separate studies (one prospective, the other retrospective using triggers) by the same investigators at the same EDs – there was an 18-fold greater diagnostic adverse event rate and 27-fold greater misdiagnosis-related mortality rate when using the prospective design. Differences within the four retrospective studies were readily attributed to outcome windows for ascertainment. Although these retrospective results varied substantially with respect to diagnostic adverse event rates (from 0.01 percent at a large tertiary care ED in the US to 1.6 percent at a small regional ED in Denmark), they were nevertheless fairly comparable, given their design differences (time window for assessment, academic vs. non-academic setting). Results were ordinal, as expected based on limiting the determination of outcome events (i.e., the shorter the window for determination of outcomes, the lower the rate,

and vice versa); the same was true for mortality, but with less precision.

‡ Although the misdiagnosis-related mortality estimates from the Calder, 2010 study were imprecise (with a fairly wide confidence interval around the point estimate of 0.2%, 95% CI 0.005-1.1), results from the other strong, prospective study (Hautz, 2019), which included 33 deaths, were very consistent. We can account for the fact that Hautz, 2019 focused only on admitted patients (who are likely to be at substantially higher risk of death), by constructing a weighted average based on the proportion of ED cases admitted. If misdiagnosis-related deaths only occurred among admitted ED patients (not those discharged), the overall misdiagnosis-related mortality rate based on Hautz would be 0.07 percent. If the death rate among those discharged were the same as in Calder, 2010 (0.2%, 95% CI 0.005-1.1), the overall rate would be 0.25 percent, with a plausible lower bound of 0.08 percent and upper bound of 1.0 percent. The estimate is further corroborated by the fraction of short-term ED deaths, which suggests that a rate of 0.20-0.25% corresponds to 6.7-8.3 percent of post-ED deaths (3.0% 30-day death rate overall) being caused by diagnostic error, which matches fairly closely estimates from autopsy-based studies among hospitalized patients (see KQ2 text for additional details).

Table D-7. Strength of evidence of studies that evaluate the false negative rates for each condition in the emergency department

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
Stroke	19 Retrospective cohorts ^{42, 44, 60, 95, 114, 127, 138, 144, 160, 162, 164, 168, 182, 190, 195, 200, 205, 216, 217} (53,417)	Medium*	Direct	Consistent	Precise	Undetected	High	Among patients with stroke, 17% (95% CI 11% to 23%) are initially misdiagnosed in the emergency department, but false negative rates tend to vary substantially based on presenting symptoms and, to a lesser extent, stroke subtype.
Pediatric stroke	1 Retrospective cohort ⁴⁸ (91)	High [†]	Direct	NA (single study)	Imprecise	Undetected	Insufficient	The available evidence is insufficient to draw a conclusion about false negative rates.
Myocardial infarction	4 Retrospective cohorts ^{97, 99, 120, 170} (375,588) 2 Cross-sectional studies ^{24, 28} (483,611)	Medium	Direct	Consistent	Precise	Undetected	High	Among patients with myocardial infarction, 1.6% (95% CI 1% to 2%) are initially misdiagnosed in the emergency department.
Aortic aneurysm and dissection	11 Retrospective cohorts ^{49, 62, 82, 85, 94, 107, 122, 128, 151, 180, 207} (2735 [‡])	Medium [§]	Direct	Consistent [#]	Precise	Undetected	Moderate	Among patients with aortic aneurysm and dissection, 28% (95% CI 22% to 34%) are initially misdiagnosed in the emergency department.
Venous thromboembolism	1 Prospective cohort ⁹³ (397) 2 Retrospective cohorts ^{121, 125} (2360)	Medium [¶]	Direct	Consistent	Precise	Undetected	Moderate	Among patients with venous thromboembolism, 20% (95% CI, 17% to 24%) are initially misdiagnosed in the emergency department.
Meningitis and encephalitis	1 Retrospective cohort ²¹⁸ (521)	Medium ^{**}	Direct	NA (single study)	Precise	Undetected	Low	Among patients with meningitis/encephalitis, 22% (95% CI, 18% to 26%) are initially misdiagnosed in the emergency department.
Sepsis	4 Retrospective cohorts ^{137, 171, 218, 219} (3479)	Medium	Direct	Inconsistent ^{††}	Precise	Undetected	Moderate	Among patients with sepsis, 19% (95% CI, 11% to 27%) are initially misdiagnosed in the emergency department.
Arterial thromboembolism	1 Retrospective cohort ²²⁰ (72)	Medium [¶]	Direct	NA (single study)	Imprecise	Undetected	Low	Among patients with arterial thromboembolism (mesenteric ischemia), 15%

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
								(95% CI, 7.9% to 26%) are initially misdiagnosed in the emergency department.
Spinal and intracranial abscess	0 studies ^{‡‡}	NA	NA	NA	NA	NA	No studies ^{‡‡}	NA ^{‡‡}
Pneumonia	1 Prospective cohort ¹⁸ (180)	Medium	Direct	NA (single study)	Precise	Undetected	Low	Among patients with pneumonia, 14% (95% CI 10% to 20%) are initially misdiagnosed in the emergency department.
Appendicitis	2 Retrospective cohorts ^{39, 137} (874 ^{§§})	Medium	Direct	Consistent	Precise	Undetected	Moderate	Among patients with appendicitis, between 2.5% and 4.8% are initially misdiagnosed in the emergency department. ^{§§}
Fractures	3 Prospective cohorts ^{109, 158, 214} (2767) 9 Retrospective cohorts ^{1, 76, 81, 102, 126, 153, 172, 176, 188} (133,657) 1 Cross-sectional study ¹⁸³ (196)	Medium ^{§§}	Direct	Consistent ^{§§}	Precise	Undetected	Moderate	Among patients with fractures, 1.0% (95% CI 0.9% to 1.2%) are initially misdiagnosed in the emergency department, but rates range from 0.02 to 40 percent depending on study population and design.
Testicular torsion	2 Retrospective cohorts ^{150, 184} (262)	Medium	Direct	NA ^{##}	Precise	Undetected	Low	Among patients with testicular torsion, 5.3% (95% CI, 2.7% to 9.3%) are initially misdiagnosed in the emergency department.

CI = confidence interval; NA = not applicable

* Observational studies with some concerns for study limitations, such as referral bias,⁶⁰ unclear definition of diagnostic errors,^{42, 195} sampling error,¹⁶⁴ and ascertainment bias.¹²⁷

† Observational study with no standard definition for diagnostic error, unclear study timepoints, and inferred diagnostic error.

‡ Two studies likely had overlapping study populations so the overall number of participants is less than what is reported here.^{122, 180}

§ Retrospective studies with an unclear or low risk of bias conducted a look back analysis to determine the rate of false negative diagnoses.

One study, which used a different definition of diagnostic error, reported a false negative rate that was higher than the other studies.¹²⁸

¶ Cohort studies had a low risk of bias.

** Retrospective, look-back analysis

†† Wide range of diagnostic sensitivity (41% to 97%).

‡‡ Two studies excluded on technical grounds, but with relevant, high-quality data reported. One detailed study of missed spinal abscess cases drawn from a large national clinical data repository through the Veterans Administration (Bhise et al., 2017) was captured but excluded from the review at the full text stage solely because the proportion of cases seen in the ED (as opposed to ambulatory clinic settings) could not be verified (it was otherwise eligible for the review); the study reported a spinal abscess miss rate of 56 percent (n=66 of 119). A second study (Davis et al., 2004) was excluded based on study dates because the proportion of cases included after the year 2000 was not known and results with

more recent cases were not segregated (it was otherwise eligible for the review); the study reported a spinal abscess diagnostic delay rate of 75 percent (n=47 of 63), including 68 percent (n=43 of 63) with multiple ED visits. Taken together, the spinal abscess false negative rate based on these two studies is estimated to be 62% (n=113 of 182, 95% CI 55-69).

§§ One additional retrospective cohort study reported that among 3,685 patients who were diagnosed with constipation in the ED, seven were later diagnosed with appendicitis.³⁷ These were observational studies, some with a high risk of bias. Studies of patients with fractures differed substantially in the study populations assessed and in definitions. For two large studies of ED misdiagnosis for all-comers with fracture, the error rate was 1.0 percent (n=329 of 31,836, 95% CI 0.9-1.2), but rates ranged from 0.02 to 40 percent.

Studies reported results differently, making it difficult to determine consistency. Bayne et al., 2017 enabled an estimate of ED false negative rate (n=11 of 208 total cases, all in the “delayed presentation” subgroup [n=94]). Chan et al., 2019 focused on testing delays and radiographic errors.

Table D-8. Strength of evidence of studies that evaluate the false omission rates for each condition in the emergency department

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
Stroke	1 Retrospective cohort ¹⁵⁴ (2,101,081)	Medium	Direct	NA (single study)	Precise	Undetected	High	Among patients who are discharged from the ED with a diagnosis of headache, the false omission rate of stroke is 0.2%.
Myocardial infarction	1 Retrospective cohort ¹²⁰ (324,580)	Medium	Direct	NA (single study)	Precise	Undetected	High	Among patients who are discharged from the ED with a diagnosis of chest pain or dyspnea, the false omission rate of myocardial infarction is 0.2% (95% CI, 0.1 to 0.2%).
Aortic aneurysm and dissection	0 studies	NA	NA	NA	NA	NA	No studies	NA
Venous thrombo-embolism	0 studies	NA	NA	NA	NA	NA	No studies	NA
Meningitis and encephalitis	0 studies	NA	NA	NA	NA	NA	No studies	NA
Sepsis	0 studies	NA	NA	NA	NA	NA	No studies	NA
Arterial thrombo-embolism	0 studies	NA	NA	NA	NA	NA	No studies	NA
Spinal and intracranial abscess	1 Retrospective cohort ¹⁵⁴ (1,381,614)	Medium	Direct	NA (single study)	Precise	Undetected	High	Among patients who are discharged from the ED with a diagnosis of benign back pain, the false omission rate of spinal abscess is 0.1%
Pneumonia	1 Prospective cohort ¹⁸ (278)	Medium	Direct	NA (single study)	Precise	Undetected	Low	Among elderly patients admitted for acute respiratory failure, the false omission of pneumonia is 9% (95% CI, 7% to 13%).
Appendicitis	0 studies	NA	NA	NA	NA	NA	No studies	NA
Fractures	0 studies	NA	NA	NA	NA	NA	No studies	NA

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
Testicular torsion	0 studies	NA	NA	NA	NA	NA	No studies	NA

CI = confidence interval; ED = emergency department; NA = not applicable

Table D-9. Strength of evidence of studies that evaluate the false positive rates for each condition in the emergency department

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
Pneumonia	1 Prospective cohort ¹⁸ (333)	Medium	Direct	NA (single study)	Precise	Undetected	Low	Among patients without pneumonia, 24% (95% CI 20% to 29%) are initially misdiagnosed as having pneumonia in the ED.

CI = confidence interval; ED = emergency department; NA = not applicable

Table D-10. Strength of evidence of studies that evaluate the false discovery rates for each condition in the emergency department

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
Stroke	2 Prospective cohorts ^{32, 221} (695) 14 Retrospective studies ^{43, 53, 55, 72, 84, 86, 106, 110, 113, 147, 159, 191, 216, 222} (8,048)	Medium*	Direct	Consistent†	Precise	Undetected	High	Among patients who are diagnosed with stroke, the false discovery rate is 14% (95% CI, 8% to 19%). Among patients with a presumptive diagnosis of TIA, the false discovery rate is 49% (95% CI, 33% to 65%).
Myocardial infarction	3 Retrospective cohorts ^{71, 149, 157} (1563)	Medium	Direct	Inconsistent	Precise	Undetected	Low	Among patients who are referred for immediate cardiac catheterization, 14% will not have a myocardial infarction.
Aortic aneurysm and dissection	1 study ¹⁰⁷ (100)	High	Direct	NA (single study)	Imprecise	Undetected	Low	Among patients who are suspected of having an aortic aneurysm or dissection, 7% did not have this condition in the final diagnosis.
Venous thrombo-embolism	0 studies	NA	NA	NA	NA	NA	No studies	NA
Meningitis and encephalitis	0 studies	NA	NA	NA	NA	NA	No studies	NA
Sepsis	0 studies	NA	NA	NA	NA	NA	No studies	NA
Arterial thrombo-embolism	0 studies	NA	NA	NA	NA	NA	No studies	NA
Spinal and intracranial abscess	0 studies	NA	NA	NA	NA	NA	No studies	NA
Pneumonia	1 Prospective cohort ¹⁸ (236)	Medium	Direct	NA (single study)	Precise	Undetected	Low	Among patients initially diagnosed as pneumonia in the emergency department, 34% (95% CI 29% to 41%) are incorrect.
Appendicitis	2 Prospective cohorts ^{25, 77} (330)	Medium	Direct	Consistent	Precise	Undetected	Moderate	While the sensitivity of appendicitis diagnosis in ED is very high, the false positive rate is relatively high. The studies included a combination of prospective and retrospective

Condition	Number of studies (participants)	Study limitations	Directness	Consistency	Precision	Reporting bias	Strength of evidence	Summary
	3 Retrospective cohorts ^{108, 137, 166} (3,917)							cohorts. However, case selection due to inclusion criteria for certain studies limited their generalizability.
Fractures	1 Prospective cohort ¹⁵⁸ (125) 2 Retrospective cohorts ^{102, 176} (398)	Medium	Direct	Inconsistent	Imprecise	Undetected	Insufficient	We are unable to draw a conclusion.
Testicular torsion	1 Retrospective cohort ¹⁵⁰ (46)	Medium	Direct	NA (Single study)	Imprecise	Undetected	Insufficient	We are unable to draw a conclusion.

* Observational studies, some with concerns of selection bias^{147,159} or lack of generalizability due to the use of specific local protocols.³²

† Results are consistent within subtypes of stroke.

References for Appendix D

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