



Effective Health Care

Treatment of Common Hip Fractures

Results of Topic Selection Process & Next Steps

The nominator, a director of an orthopedic residency, is interested in an updated evidence review of the 2009 AHRQ systematic review on hip fracture treatment to inform clinicians, patients and their caregivers, and to assist in surgical decisions.

A new evidence review would be partially duplicative of 25 existing systematic reviews. In addition, a partner was not identified who is willing to use the review to promote practice-based change. For these reasons, the Effective Health Care (EHC) Program will undertake no further activity on this nomination.

Topic Brief

Topic Name: Treatment of Common Hip Fractures

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Authors

David Niebuhr

Conflict of Interest: None of the investigators has any affiliations or financial involvement that conflicts with the material presented in this report

Summary

- This nomination does not meet all selection criteria, specifically **duplication and value**.
- A systematic review on this topic is potentially duplicative with an American Academy of Orthopaedic Surgeons (AAOS) in progress systematic review and update of their 2014 Clinical Practice Guideline on the Management of Hip Fractures in the Elderly.
- A new review would have limited value. We reached out to the group most likely to promote practice-based change in this area orthopedic surgeons; however they declined this opportunity to partner with AHRQ to update this review.

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Background

AHRQ estimates that over 300,000 people over the age of 65 are hospitalized each year.¹ More than 95% of hip fractures are caused by falling,² usually by falling sideways.³ The risk of hip fracture, osteoporosis and falls increase with age. Falls in the elderly are associated with poor vision, balance problems, cognitive impairment, and the use of multiple medications. Hip fractures are also associated with female sex, physical inactivity, tobacco and alcohol use. Patient centered outcomes associated with hip fractures include nonunion, malunion, wound infection, implant failure, additional surgery, thromboembolism, functional impairment, inability to live independently. Perioperative mortality is about 10% and one-year mortality after fracture is about 30%.⁴ The type of fracture, surgical intervention, implant and patient variables are likely associated with patient centered outcomes.

In general, there are three different types of hip fractures. The type of fracture depends on what area of the upper femur is involved. Intracapsular fractures occur at the level of the neck and the head of the femur, and are generally within the capsule. Intertrochanteric fractures occur at the level of the neck and the head of the femur, and are generally within the capsule.

Subtrochanteric fractures occurs below the lesser trochanter. Hip fracture implant variables include the position, material, method, and design of the implant. Surgical interventions in general include internal fixation or arthroplasty.

Nominator and Stakeholder Engagement:

The nominator is the director of an orthopedic residency. They requested an update of a 2009 AHRQ SR on hip fracture treatment. However, we were unable to contact the nominator to discuss their plans for using a new systematic review. We contacted the Department of Research, Quality, and Scientific Affairs at AAOS about potentially partnering on the hip fracture systematic review update. AAOS will be updating of their hip fractures in the elderly guideline in 2019 (original publication was 2014). After reviewing the AHRQ 2009 systematic review their staff believed that both efforts would be duplicative. AAOS plans to perform their own review to inform their guideline, using existing systematic reviews to identify primary study, and declined the opportunity to partner with AHRQ on updating the 2009 AHRQ systematic review.

The key questions for this nomination, based on the AHRQ 2009 systematic review are:

Key Question 1 – What is the relationship between patient variables (e.g., demographic factors, comorbidities), the type of fracture (i.e., intertrochanteric, subtrochanteric, subcapital) and post-treatment outcomes (e.g., pain, mobility, mortality)?

Key Question 2 – What is the relationship between the type of fracture (i.e., intertrochanteric, subtrochanteric, subcapital) and post-treatment outcomes (e.g., pain, mobility, mortality)?

Key Question 3 – What is the relationship between implant variables (e.g., position, material, method, and design of implant) and patient post-treatment outcomes (e.g., pain, mobility, mortality)?

Key Question 4 – What is the relationship between the type of intervention (e.g., internal fixation versus arthroplasty) and patient post-treatment outcomes (e.g., pain, mobility, mortality)?

To define the inclusion criteria for the key questions we specify the population, interventions, comparators, outcomes, timing, and setting (PICOTS) of interest (Table 1).

Table 1. Key Questions and PICOTS

Key Questions 1 and 2	What is the relationship between patient variables (e.g., demographic factors, comorbidities), the type of fracture (i.e., intertrochanteric, subtrochanteric, subcapital) and post-treatment outcomes (e.g., pain, mobility, mortality)?	What is the relationship between the type of fracture (i.e., intertrochanteric, subtrochanteric, subcapital) and post-treatment outcomes (e.g., pain, mobility, mortality)?
Population	Hip fractured adult (50+ years old) patient variables (e.g., demographic factors, comorbidities), and the type of fracture (i.e., intertrochanteric, subtrochanteric, subcapital)	Type of hip fracture (i.e., intertrochanteric, subtrochanteric, subcapital) in adults (50+ years old)
Interventions	Internal fixation (various methods), arthroplasty (hemi vs. total and cemented vs. uncemented), surgical approach, method and implant (i.e. material, surface, design)	Internal fixation (various methods), arthroplasty (hemi vs. total and cemented vs. uncemented), surgical approach, method and implant (i.e. material, surface, design)
Comparators	Head to head comparisons of interventions	Head to head comparisons of interventions
Outcomes	Pain, function, residence, mortality	Pain, function, residence, mortality
Timing	Acute and post-acute (unrestricted)	Acute and post-acute (unrestricted)
Setting	Hospitalized patients	Hospitalized patients

Key Questions 3 and 4	What is the relationship between implant variables (e.g., position, material, method, and design of implant) and patient post-treatment outcomes (e.g., pain, mobility, mortality)?	What is the relationship between the type of intervention (e.g., internal fixation versus arthroplasty) and patient post-treatment outcomes (e.g., pain, mobility, mortality)?
Population	Hip fractured adult (50+ years old) patients and various implant variables (e.g., position, material, method, and design of implant)	Hip fractured adult (50+ years old) patients and various the type of intervention (e.g., internal fixation versus arthroplasty)
Interventions	Internal fixation (various methods), arthroplasty (hemi vs. total and cemented vs. uncemented), surgical approach, method and implant (i.e. material, surface, design)	Internal fixation (various methods), arthroplasty (hemi vs. total and cemented vs. uncemented), surgical approach, method and implant (i.e. material, surface, design)
Comparators	Head to head comparisons of interventions	Head to head comparisons of interventions
Outcomes	Pain, function, residence, mortality	Pain, function, residence, mortality

Timing	Acute and post-acute (unrestricted)	Acute and post-acute (unrestricted)
Setting	Hospitalized patients	Hospitalized patients

Methods

We assessed nomination Treatment of Common Hip Fractures, for priority for a systematic review or other AHRQ EHC report with a hierarchical process using established selection criteria (Appendix A). Assessment of each criteria determined the need for evaluation of the next one.

1. Determine the *appropriateness* of the nominated topic for inclusion in the EHC program.
2. Establish the overall *importance* of a potential topic as representing a health or healthcare issue in the United States.
3. Determine the *desirability of new evidence review* by examining whether a new systematic review or other AHRQ product would be duplicative.
4. Assess the *potential impact* a new systematic review or other AHRQ product.
5. Assess whether the *current state of the evidence* allows for a systematic review or other AHRQ product (feasibility).
6. Determine the *potential value* of a new systematic review or other AHRQ product.

Appropriateness and Importance

We assessed the nomination for appropriateness and importance.

Desirability of New Review/Duplication

We searched for high quality, completed or in-process evidence reviews published in the last three years on the key questions of the nomination. See Appendix B for sources searched.

Impact of a New Evidence Review

The impact of a new evidence review was qualitatively assessed by analyzing the current standard of care, the existence of potential knowledge gaps, and practice variation. We considered whether it was possible for this review to influence the current state of practice through various dissemination pathways (practice recommendation, clinical guidelines, etc.).

Value

We assessed the nomination for value. We considered whether or not the clinical, consumer, or policymaking context had the potential to respond with evidence-based change; and if a partner organization would use this evidence review to influence practice.

Compilation of Findings

We constructed a table with the selection criteria and our assessments (Appendix A).

Results

Appropriateness and Importance

Hip fractures are an important source of morbidity, disability and mortality in elderly Americans. They also are significant direct and indirect costs to the U.S. health care system. Orthopedic

surgeons face uncertainty in terms of the optimal surgical approach, method and implant device for each of the variety of fracture types and individual patient factors.

Impact of a New Evidence Review

The impact of a new review is significant. The standard of care for surgical treatment of hip fractures is unclear in terms of optimal method, approach, type of implant by type of fracture. The 2014 AAOS guideline is not current.

Desirability of a New Review/Duplication

A new evidence review would be partially duplicative of existing systematic reviews. We found 25 systematic reviews⁵⁻²⁸ including one in the Cochrane Library of Systematic Reviews published in 2014⁵ and two protocols in progress.

We identified 4 SRs for key question 2⁶⁻⁹; 6 reviews for KQ #3¹⁰⁻¹⁵ and 15 SRs for KQ#4¹⁶⁻²⁹. No SRs were found related to KQ#1. The year of SR publication was as follows: 7 in 2017, 5 in 2016, 5 in 2015 and 8 in 2014. The reviews assessed these interventions/comparisons:

- KQ#2: arthroplasty vs. internal fixation, intramedullary nailing techniques, anterior vs. posterior approach for femoral head fractures
- KQ#3: cemented vs. cementless hemiarthroplasty, short vs. long cephalomedullary nail, unipolar vs. bipolar hemiarthroplasty for displaced femoral neck fractures
- KQ#4: intramedullary fixation vs. arthroplasty, surgical vs. conservative treatment of undisplaced femoral neck fractures, intramedullary vs. extramedullary fixation, external fixation vs. dynamic hip screw, percutaneous compression plate versus intramedullary nail, gamma nail vs. sliding hip screw, helical blades vs. lag screws in intertrochanteric fractures, bipolar hemiarthroplasty vs. total hip arthroplasty, proximal femoral nail antirotation vs. dynamic hip screw, primary vs. salvage total hip arthroplasty

We identified two in-process reviews:

- Systematic review of the epidemiology of surgical site infection in hip fracture of the epidemiology of surgical site infection in hip fracture surgery. PROSPERO 2017 CRD42017050685⁶
- Immediate versus delayed surgery for hip fractures in the elderly patients: a protocol for a systematic review and meta-analysis⁷

Value

The value of a new review is limited. The 2014 AAOS clinical practice guideline (CPG) is in the process of being updated based on their internal systematic review. AAOS declined to partner with AHRQ on an update of our systematic literature review on management of hip fractures. AAOS stated that they would use the SR to identify landmark primary studies for their own review.

Table 2. Key Questions and Results for Duplication

Key Question	Duplication (1/2014-12/2017)
KQ #1	Total number of identified systematic reviews: None
KQ #2	Total number of identified systematic reviews: 4 ^{8, 9-11} <ul style="list-style-type: none"> Interventions/Comparisons include: arthroplasty vs. internal fixation, intramedullary nailing techniques, anterior vs. posterior approach for femoral head fractures
KQ #3	Total number of identified systematic reviews: 6 ¹²⁻¹⁷ <ul style="list-style-type: none"> Interventions/Comparisons include: cemented vs. cementless hemiarthroplasty, short vs. long cephalomedullary nail, unipolar vs. bipolar hemiarthroplasty for displaced femoral neck fractures
KQ #4	Total number of identified systematic reviews: 15 ^{5, 13, 18-30} <ul style="list-style-type: none"> Interventions/Comparisons include: intramedullary fixation vs. arthroplasty, surgical vs. conservative treatment of undisplaced femoral neck fractures, intramedullary vs. extramedullary fixation, external fixation vs. dynamic hip screw, percutaneous compression plate versus intramedullary nail, gamma nail vs. sliding hip screw, helical blades vs. lag screws in intertrochanteric fractures, bipolar hemiarthroplasty vs. total hip arthroplasty, proximal femoral nail antirotation vs. dynamic hip screw, primary vs. salvage total hip arthroplasty

Abbreviations: AHRQ=Agency for Healthcare Research and Quality; KQ=Key Question;

Summary of Findings

- Appropriateness and importance: The topic is both appropriate and important.
- Duplication: A new review would be partially duplicative with published systematic reviews from 2014-2017 and with an American Academy of Orthopaedic Surgeons (AAOS) in progress systematic review and update of their 2014 Clinical Practice Guideline on the Management of Hip Fractures in the Elderly.
- Impact: A new systematic review has high potential impact. The AAOS 2014 review and guideline is not current. Questions regarding the standard of care for hip fractures in terms of surgical approach, method and implant device remain.
- Value: The potential for value is limited. The 2014 AAOS CPG is in the process of being updated based on their internal systematic review. AAOS declined to partner with AHRQ on an update of our systematic literature review on management of hip fractures. AAOS stated that they would use the SR to identify landmark primary studies for their own review.

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Appendix A. Selection Criteria Summary

Selection Criteria	Assessment
1. Appropriateness	
1a. Does the nomination represent a health care drug, intervention, device, technology, or health care system/setting available (or soon to be available) in the U.S.?	Yes
1b. Is the nomination a request for a systematic review?	Yes
1c. Is the focus on effectiveness or comparative effectiveness?	Yes
1d. Is the nomination focus supported by a logic model or biologic plausibility? Is it consistent or coherent with what is known about the topic?	Yes
2. Importance	
2a. Represents a significant disease burden; large proportion of the population	Hip fractures represent a significant burden on the elderly in terms of incidence, health care utilization, long term morbidity (functional impairment) and mortality
2b. Is of high public interest; affects health care decision making, outcomes, or costs for a large proportion of the US population or for a vulnerable population	Yes the U.S. elderly population is increasing and the incidence of hip fractures is expected to increase. Elderly people who cannot live independently after a hip fracture are a vulnerable population.
2c. Represents important uncertainty for decision makers	The optimal timing, approach, procedure, implanted devices for the various types of fractures and patient factors has not been established by prior systematic reviews.
2d. Incorporates issues around both clinical benefits and potential clinical harms	Hip fracture repairs are associated with significant side effects including infection, prosthesis failure, mal-union, nonunion, thromboembolic conditions and death.
2e. Represents high costs due to common use, high unit costs, or high associated costs to consumers, to patients, to health care systems, or to payers	Hip fracture surgery, post-acute and rehabilitative care and potentially long term assisted living represent significant costs to patients, health care systems and payers.

Selection Criteria	Assessment
3. Desirability of a New Evidence Review/Duplication	
3. Would not be redundant (i.e., the proposed topic is not already covered by available or soon-to-be available high-quality systematic review by AHRQ or others)	A systematic review on this topic would be duplicative with an American Academy of Orthopaedic Surgeons (AAOS) in progress systematic review and update of their 2014 Clinical Practice Guideline on the Management of Hip Fractures in the Elderly. However, the AAOS 2014 guideline report did not include report main elements expected in a systematic review, including the PICOTS, risk of bias assessments and SOE for each intervention/outcome. Areas of insufficient evidence and research gaps were not identified. A protocol for the review underpinning the AAOS in-process guideline is not publicly available.
4. Impact of a New Evidence Review	
4a. Is the standard of care unclear (guidelines not available or guidelines inconsistent, indicating an information gap that may be addressed by a new evidence review)?	Yes. The AAOS guideline is not current. Questions regarding the standard of care for hip fractures in terms of surgical approach, method and implant device remain.
4b. Is there practice variation (guideline inconsistent with current practice, indicating a potential implementation gap and not best addressed by a new evidence review)?	There is practice variation in surgical approach to hip fractures, but this will be addressed by the AAOS systematic review and CPG update.
5. Primary Research	
5. Effectively utilizes existing research and knowledge by considering: - Adequacy (type and volume) of research for conducting a systematic review - Newly available evidence (particularly for updates or new technologies)	NA
6. Value	
6a. The proposed topic exists within a clinical, consumer, or policy-making context that is amenable to evidence-based change	Yes. The 2014 AAOS CPG is in the process of being updated based on their internal systematic review.
6b. Identified partner who will use the systematic review to influence practice (such as a guideline or recommendation)	No. AAOS declined to partner with AHRQ on an update of our systematic literature review on management of hip fractures. AAOS stated that they would use the SR to identify landmark primary studies for their own review.

Abbreviations: AAOS=American Academy of Orthopaedic Surgeons; AHRQ=Agency for Healthcare Research and Quality; CPG=clinical practice guideline; KQ=Key Question; NA=not applicable; PICOTS=population, intervention, comparator, outcome, timing, setting; SOE=strength of evidence; SR=systematic review

Appendix B. Search for Evidence Reviews (Duplication)

Listed are the sources searched.

AHRQ: Evidence reports and technology assessments, USPSTF recommendations

VA Products: PBM, and HSR&D (ESP) publications, and VA/DoD EBCPG Program
www.hsrd.research.va.gov

Cochrane Systematic Reviews and Protocols <http://www.cochranelibrary.com/>

PubMed

PubMed Health <http://www.ncbi.nlm.nih.gov/pubmedhealth/>

HTA (CRD database): Health Technology Assessments <http://www.crd.york.ac.uk/crdweb/>

PROSPERO Database (international prospective register of systematic reviews and protocols)
<http://www.crd.york.ac.uk/prospero/>

CADTH (Canadian Agency for Drugs and Technologies in Health) <https://www.cadth.ca/>

DoPHER (Database of promoting health effectiveness reviews)
<http://eppi.ioe.ac.uk/webdatabases4/Intro.aspx?ID=9>

ECRI institute <https://www.ecri.org/Pages/default.aspx>

Secondary Sources checked on an as needed basis

Campbell Collaboration <http://www.campbellcollaboration.org/>

McMaster Health System Evidence <https://www.healthsystemsevidence.org/>

Robert Wood Johnson <http://www.rwjf.org/>

Systematic Reviews (Journal) : protocols and reviews
<http://systematicreviewsjournal.biomedcentral.com/>

UBC Centre for Health Services and Policy Research <http://chspr.ubc.ca/>

WHO Health Evidence Network <http://www.euro.who.int/en/data-and-evidence/evidence-informed-policy-making/health-evidence-network-hen>