Comparative Effectiveness Review
Number 200

Effective Health Care Program

Diagnostic Accuracy of Screening and Treatment of Post–Acute Coronary Syndrome Depression: A Systematic Review

Evidence Summary

Objectives and Rationale for Review

Patients who are diagnosed with acute coronary syndrome (ACS) are at increased risk for mental health problems—including major depressive disorder (MDD) and elevated symptoms of depression. For the purpose of this review, ACS refers to clinical symptoms compatible with acute myocardial ischemia and includes unstable angina, non–ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI).

The objectives of the systematic review are:

- To evaluate the diagnostic accuracy of selected depression screening instruments.
- To assess the comparative safety and effectiveness of pharmacologic and nonpharmacologic treatments for depression in adult patients within 3 months of an ACS event.

Post-ACS Screening Strategies

A number of screening tools for depression have been developed. This review sought to evaluate tools, which were feasible to use and have been validated in general populations. These tools and strategies were compared against the gold standard of a validated criterion standard (e.g.,

Purpose of Review

Evaluate the comparative accuracy of tools for diagnosing depression in patients after an acute coronary syndrome event and the effectiveness of treatments in these patients.

Key Messages

- The Beck Depression Inventory (BDI)-II screen tool is the most studied and is as accurate in this population as in others.
- Available depression-screening tools may miss 3 percent of people with depression, but less than 50 percent of those who screen positive have clinically confirmed depression.
- Enhanced care interventions that integrate psychiatric treatment into cardiology and primary care settings improve depression symptoms. Current evidence is insufficient to determine if enhanced care improves cardiac outcomes.
- Combining cognitive behavioral therapy and antidepressant medication may improve depression outcomes but does not clearly improve cardiac outcomes.

AHRQ
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Diagnostic and Statistical Manual of Mental Disorders [DSM]or International Classification of Diseases [ICD] criteria) administered by a trained interviewer.

Post-ACS Treatment Strategies

Pharmacologic treatments included second-generation antidepressants (e.g., selective serotonin reuptake inhibitor [SSRIs], serotonin-norepinephrine reuptake inhibitor [SNRIs]), atypical antipsychotics, and tricyclic antidepressants.

Nonpharmacologic treatments included various types of psychotherapy, aerobic exercise, selected dietary supplements, cardiac rehabilitation, education/psychoeducation, stress management, psychosocial support, transcranial magnetic stimulation, electroconvulsive therapy, and combinations of these approaches.

Enhanced care delivery strategies, which integrate psychiatric treatment into other clinical settings, also were evaluated. In such strategies, patients are treated by a team that usually includes a primary care clinician, a case manager who provides support and outreach to patients, and a mental health specialist (e.g., psychiatrist) who provides consultation and supervision. Other elements include a structured treatment plan that involves pharmacotherapy and/or other interventions (e.g., patient education or cognitive-behavioral therapy), scheduled followup visits, communication among the members of the treatment team, and measurement-based care.

Key Questions and Scope of Review

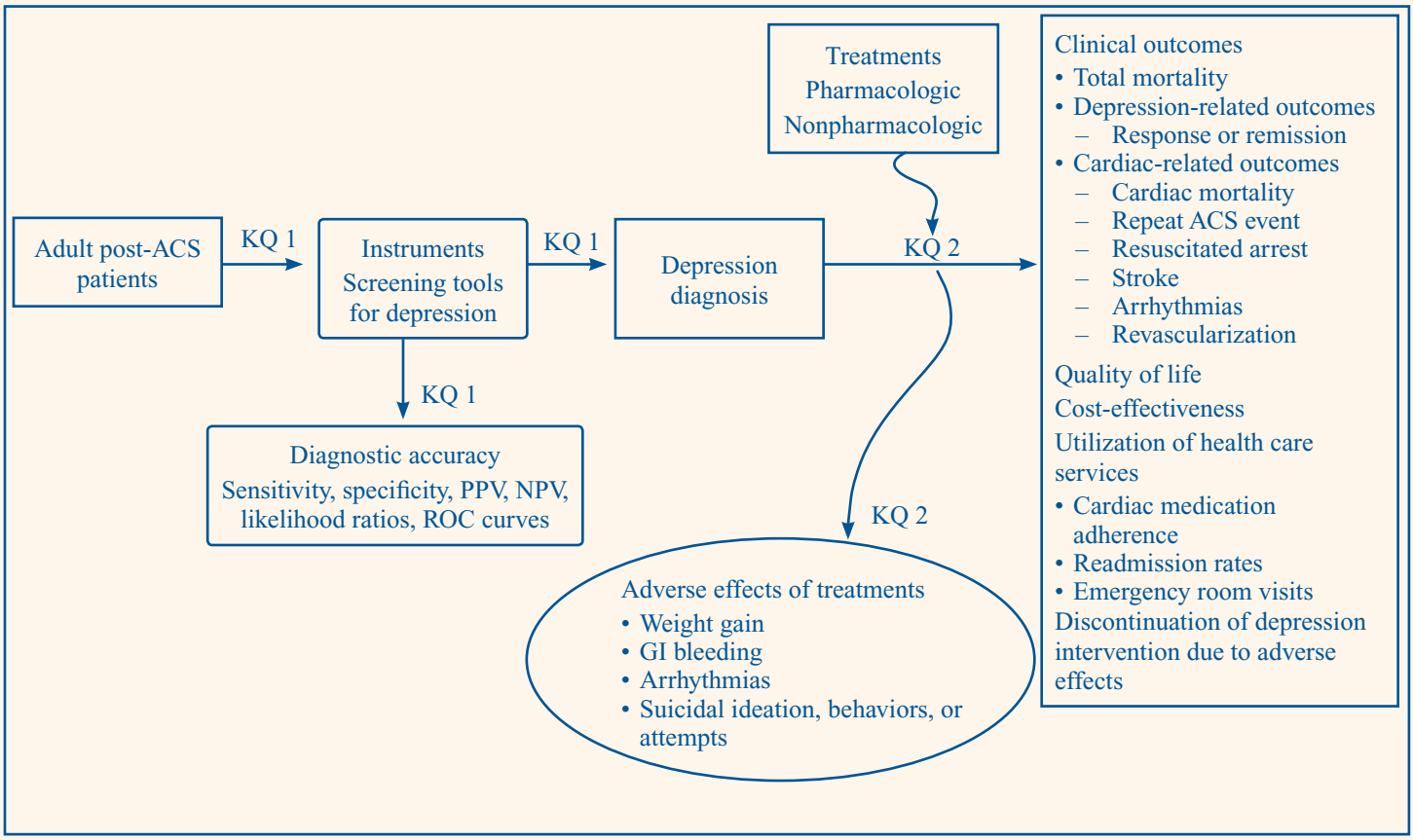
The Key Questions (KQs) follow:

KQ 1: What is the accuracy of depression screening instruments or screening strategies compared to a validated criterion standard in post-ACS patients?

KQ 2: What are the comparative safety and effectiveness of pharmacologic and nonpharmacologic depression treatments in post-ACS patients?

Figure A shows the scope of the review.

Figure A. Analytic framework



Abbreviations: ACS=acute coronary syndrome; GI=gastrointestinal; KQ=Key Question; NPV=negative predictive value; PPV=positive predictive value; ROC=receiver operating characteristic

Data Sources

MEDLINE® (via PubMed®), Embase®, PsycINFO®, CINAHL®, and the Cochrane Database of Systematic Reviews (CDSR), bibliographic databases from January 1, 2003, to August 15, 2017; hand searches of references of relevant studies and www.clinicaltrials.gov.

The finalized protocol is posted on the EHC Web site (www.effectivehealthcare.ahrq.gov). The PROSPERO registration is CRD42016047032.

Results

KQ 1: Diagnostic Accuracy of Depression Screening Tests in Post-ACS Patients

We identified seven articles representing six studies that examined the accuracy of depression screening instruments or screening strategies in post-ACS patients (Table A).

Table A. Key Question 1 evidence summary

Number of studies: 6
Study publication years: 2005-2013
Number of patients: 1,755
Men: 1,343 (77%)
Women: 412 (23%)
Mean age range: 57 to 63 years
Race/ethnicity: Unavailable
Settings: Inpatient (5); cardiac rehabilitation clinic (1)
Countries: USA (3), Canada (2), UK/Europe (1)
Screening instruments:[a] Beck Depression Inventory-II (BDI-II); Hospital Anxiety and Depression Scale (HADS); Patient Health Questionnaire (PHQ); Geriatric Depression Scale (GDS)
Criterion standard: Diagnostic and Statistical Manual of Mental Disorders III-IV major depressive disorder (MDD)

[a] Some studies examined different numbers of items and subscales for the BDI-II, HADS, and PHQ. Specific versions, subscales, and item combinations are noted where applicable, and the generic scale is referenced for statements that apply across different versions and item combinations for the scale (e.g., 2-item, 9-item, and 10-item versions of the PHQ).

Key Findings

- Four depression screening instruments have a high negative predictive value (97%) but have low (below 50%) positive predictive values. This means the instruments would miss less than 3 percent of those who have depression, but only 50 percent of patients who screen positive actually have the condition.
- The Beck Depression Inventory (BDI)-II has a sensitivity of 90 percent and a specificity of 80 percent.
- Thresholds for screening in post-ACS patient populations are comparable to thresholds used in general populations (4 studies, 1,576 patients).
- One or two specific items from validated screening scales (BDI-II, Patient Health Questionnaire [PHQ]) may be almost as accurate for diagnostic screening as using the full instrument.

Strength of Evidence

Table B shows the strength of evidence for KQ 1 findings.

Table B. Strength of evidence for the BDI-II depression tool

Test Result Strength of Evidence	Study Design (N patients)	ROB/ Directness	Inconsistency	Test Property Precision	Test Result	Number per 1,000 Tested for 10% Prevalence[a]	Number per 1,000 Tested for 20% Prevalence[a]
Sensitivity[b] High	4 cross-sectional (1,576)	Low/ Direct	Consistent	0.90 (0.86 to 0.92) Precise	True positives False negatives	90 10	180 20
Specificity[c] Moderate	4 cross-sectional (1,576)	Low/ Direct	Inconsistent	0.80 (0.68 to 0.88) Precise	False positives True negatives	180 720	160 640

[a] Number per 1,000 tested for given prevalence of major depressive disorder. Prevalence was based on the range observed in included studies.
[b] Sensitivity=true positive + false negative.
[c] Specificity=false positive + true negative.
Abbreviations: BDI=Beck Depression Inventory; CI=confidence interval; ROB=risk of bias

KQ 2: Comparative Safety and Effectiveness of Depression Treatments in Post-ACS Patients

We identified 14 articles representing 4 studies that examined the comparative safety and effectiveness of pharmacologic and nonpharmacologic treatments and enhanced care delivery approaches to usual care for the treatment of depression in post-ACS patients (Table C).

No studies were identified that evaluated nutritional supplements, aerobic exercise, cardiac rehabilitation, stress management or atypical antipsychotics, transcranial magnetic stimulation and electroconvulsive therapy.

Table C. Key Question 2 evidence summary

Number of randomized clinical trials: 4
Number of patients: 3,119
Men: 58%
Women: 42%
Race/ethnicity: (2 studies, 307 patients): Hispanic, 33%; African American, 26%
Mean age range: 57.6 to 61.1 years
Depressive disorders: Persistent depressive symptoms, major or minor depressive disorder, dysthymia, or ICD-10 depressive disorder (diagnoses 29 days to 12 months post-ACS)
Cardiac conditions: Post-ACS (2 studies) or post-myocardial infarction (MI) (2 studies)
Settings: Multicenter outpatient specialty and primary care clinics
Countries: USA, UK/Europe
Interventions: Enhanced care (2 studies), CBT and antidepressants (1 study), antidepressants only (1 study)
Comparator: Usual care
Primary outcome: Decrease in depression symptoms
Secondary outcomes: Major adverse cardiac event (MACE) or death, quality of life, treatment adherence

Abbreviations: ACS=acute coronary syndrome; CBT=cognitive behavioral therapy: ICD-10=International Classification of Disease, 10th edition

Key Findings

- Collaborative care interventions, which integrate psychiatric treatment into other clinical settings, improve depression symptoms more than usual care
- Collaborative care, CBT, or antidepressant medications were similar to usual care in reducing major adverse cardiovascular event (MACE) cardiac mortality, all-cause mortality, repeat ACS, revascularization, or hospitalization in individuals following an ACS event
- Evidence did not show increased adverse events among post-ACS individuals treated with collaborative care, CBT, or antidepressant medications compared with usual care

Strength of Evidence

Tables D–F show the strength of evidence for KQ 2 findings.

Table D. Strength of evidence for Key Question 2: Enhanced care versus usual care

Outcome	Number of Studies/ Number of Patients	Study Design/ ROB	Consistency/ Directness	Precision/ Publication Bias	Effect Estimate (95% CI)	SOE
Depression symptoms	2 studies	RCT	Consistent	Imprecise[a]	Mean difference 3.5 to -3.8 BDI SMD -0.42 (CI -0.75 to -0.10) to -0.45 (CI -0.77 to -0.14)	Moderate
	307 patients	Low	Direct	None detected		
Mental health–related function	1 study	RCT	Unknown	Imprecisea	OR 1.08 (CI 0.73 to 1.42)	Low
	150 patients	Low	Direct	None detected		
MACE	2 studies	RCT	Inconsistent	Imprecise[a]	Inconsistent results; no effect to short-term benefit (HR 0.25); short-term benefit was not sustained in long-term followup	Insufficient
	307 patients	Low	Direct	None detected		
Adverse effects	1 study	RCT	Unknown	Imprecise[a]	No difference, findings not reported by specific adverse effects	Insufficient
	157 patients	Unclear	Direct	None detected		

[a]Imprecision based on broad confidence interval or confidence interval which crosses the decisional threshold combined with few events.

Abbreviations: BDI=Beck Depression Inventory; CI=confidence interval; HR=hazard ratio; MACE=major adverse cardiovascular event; RCT=randomized controlled trial; ROB=risk of bias; SMD=standardized mean difference; SOE=strength of evidence

Table E. Strength of evidence for Key Question 2: CBT and second-generation antidepressant versus usual care

Outcome	Number of Studies/ Number of Patients	Study Design/ ROB	Consistency/ Directness	Precision/ Publication Bias	Effect Estimate (95% CI)	SOE
Depression symptoms	1 study	RCT	Unknown	Precise	Mean difference -2.7 (CI -3.7 to 1.7) BDI SMD -0.31 (CI -0.42 to -0.20)	High
	2,481 patients	Low	Direct	None detected		
Mental health–related function	1 study	RCT	Unknown	Precise	Mean difference 2.2 (CI 1.2 to 3.2) SF-12 MCS SMD 0.24	High
	2,481 patients	Low	Direct	None detected		
MACE	1 study	RCT	Unknown	Precise	HR 1.01 (CI 0.86 to 1.18) for death or nonfatal MI	Moderate
	2,481 patients	Low	Indirect[a]	None detected		
Adverse effects	NR	–	–	–	–	Insufficient

[a]Rated as indirect since 20.1% of patients enrolled for low perceived social support rather than depression.

Abbreviations: BDI=Beck Depression Inventory; CI=confidence interval; HR=hazard ratio; MACE=major adverse cardiovascular event; MCS=mental component summary; MI=myocardial infarction; NR=not reported; RCT=randomized controlled trial; ROB=risk of bias; SF-12=Short Form Health Survey; SMD=standardized mean difference; SOE=strength of evidence

Table F. Strength of evidence for Key Question 2: Antidepressant medication versus usual care

Outcome	Number of Studies/ Number of Patients	Study Design/ROB	Consistency/ Directness	Precision Publication Bias	Effect Estimate (95% CI)	SOE
Depression symptoms	1 study	RCT	Unknown	Precise	Mean BDI 11.0 vs 10.2 SMD 0.12 (CI -0.10 to 0.34)	Moderate
	331 patients	Unclear	Direct	None detected		
Mental health–related function	1 study	RCT	Unknown	Imprecise[a]	Mean at 18 months 44.5 vs 43.4 SF-36 MCS SMD 0.14	Low
	331 patients	Unclear	Direct	None detected		
MACE	1 study	RCT	Unknown	Imprecise	OR 1.07 (0.57 to 2.0) for MACE	Low
	331 patients	Unclear	Direct	None detected		
Adverse effects	NR	–	–	–	–	Insufficient

[a]Imprecision based on broad confidence interval or confidence interval which crosses the decisional threshold combined with few events.

Abbreviations: BDI=Beck Depression Inventory; CI=confidence interval; MACE=major adverse cardiovascular event; NR=not reported; MCS=mental component summary; OR=odds ratio; RCT=randomized controlled trial; ROB=risk of bias; SF-12=Short Form Health Survey; SMD=standardized mean difference; SOE=strength of evidence

Discussion

This present review is an update of the original 2005 Agency for Healthcare Research and Quality systematic review.[1] Both reviews found insufficient evidence to support the comparative effectiveness of interventions for improving cardiovascular outcomes, and both reviews recognized the effectiveness of psychosocial interventions and SSRIs on improving depression symptoms in patients after myocardial infarction.

Our systematic review has several implications for clinical and policy decisionmaking. We found that BDI-II was the most often used screening instrument among included studies. BDI-II has a high sensitivity (90%) and specificity (80%) for identifying patients requiring treatment across a range of prevalences. The performance characteristics for the BDI-II in post-ACS patients were similar to the performance in general medical and psychiatric populations. This suggests that other screening instruments that may be more feasible for use in general medical settings (e.g., shorter, easier to administer and score, no licensing fee) may also perform well in post-ACS patients. Some data within our review also suggest that very short questionnaires (1-2 questions) may perform similarly to full instruments although the evidence is currently sparse.

For treatment effectiveness, enhanced care interventions that integrate psychiatric treatment into other clinical settings, second-generation antidepressants, and a combination strategy including cognitive behavioral therapy (CBT) and antidepressant medication improved depression symptoms more than usual care but had no consistent effect on cardiovascular outcomes. Secondary analyses from the treatment trials showed generally consistent benefit of interventions on depression outcomes by sex and ethnicity. Importantly, these trials use second-generation antidepressants and/or cognitive behavioral therapy. Thus, recommendations should be limited to these interventions and not generalized to all antidepressants (e.g., tricyclic antidepressants), which may have adverse cardiovascular effects. The included studies did not show a clear beneficial effect of depression treatment on cardiovascular outcomes in this post-ACS population.

Conclusions

Among several depression screening tools, the BDI is the most studied. Existing tools miss less than 3 percent of patients with depression (high negative predictive value: 97%), but less than 50 percent of patients who screen positive actually have the condition (low positive predictive value:<50%). Enhanced care interventions and a strategy using CBT plus second-generation antidepressant medication for patients with severe depression or partial response to CBT improve depressive outcomes more than usual care. Given the inconsistency and imprecision of findings, and the small number of studies evaluating cardiovascular outcomes, the effects of depression interventions on such cardiovascular outcomes is uncertain.

Reference

1. Bush DE, Ziegelstein RC, Patel UV, et al. Post-myocardial infarction depression. Evid Rep Technol Assess (Summ). 2005 May(123):1-8. PMID: 15989376.

Full Report

This evidence summary is part of the following document: Williams JW Jr, Nieuwsma JA, Namdari N, Washam JB, Raitz G, Blumenthal JA, Jiang W, Yapa R, McBroom AJ, Lallinger K, Schmidt R, Kosinski AS, Sanders GD. Diagnostic Accuracy of Screening and Treatment of Post–Acute Coronary Syndrome Depression: A Systematic Review. Comparative Effectiveness Review No. 200. (Prepared by the Duke University Evidence-based Practice Center under Contract No. 290-2015-00004-I.) AHRQ Publication No. 18-EHC001-EF. Rockville, MD: Agency for Healthcare Research and Quality; November 2017. www.effectivehealthcare.ahrq.gov/reports/final.cfm. DOI: https://doi.org/10.23970/AHRQEPCCER200.

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