Effective Health Care

Rehabilitation for TBI, Stroke, and Other Brain Injury

Results of Topic Selection Process & Next Steps

The nominator, the American Congress of Rehabilitation Medicine (ACRM), is interested in a new AHRQ evidence review on the comparative effectiveness of rehabilitation in inpatient versus other settings for individuals with stroke, traumatic brain injury (TBI), or other brain injury; and the effectiveness of case management services for these populations.

Due to limited program resources, the program will not develop a review at this time. No further activity on this topic will be undertaken by the Effective Health Care (EHC) Program.

Topic Brief

Topic Name: Rehabilitation for TBI, Stroke and Other Brain Injury

Topic #: 0691/0692/0693

Nomination Date: June 30, 2016

Topic Brief Date: February 10, 2017

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

Summary of Key Findings:

- Appropriateness and importance: The nomination is both appropriate and important.
- Duplication: A new AHRQ review would not be duplicative of an existing product. We identified evidence reviews that partially address each of the key questions; however, these reviews did not cover the full range of subpopulations and settings of interest to the nominator.
    - We identified 11 reviews that partially addressed the 4 main key questions: 1 review pertinent to KQ1, 7 reviews pertinent to KQ2, 1 review pertinent to KQ3, and 5 reviews pertinent to KQ4. The most relevant reviews included a 2012 AHRQ review on multi-disciplinary post-acute rehabilitation for moderate to severe TBI, a 2015 Cochrane review on multi-disciplinary rehabilitation for acquired brain injury in adults of working age, a 2013 review on stroke rehabilitation, and a 2011 review on selection for inpatient rehabilitation after acute stroke.
    - We identified no reviews addressing particular subquestions, including the percentage of patients discharged to inpatient rehabilitation vs. other settings (KQ1); determination of discharge destination by time since injury (KQ1d) or

health care payer (KQ1e); effectiveness of acute care case management by severity of illness (KQ3b), age (KQ3c), or scope of services (KQ3d); and effectiveness of post-acute care case management by age (KQ4c) or time since discharge (KQd).

- Feasibility: A new AHRQ review is feasible; however we identified limited evidence on the effectiveness of case management.
    - *Size/scope of review:* We identified a total of 29 published studies across the key questions. The large majority of studies we included examined inpatient treatment settings. We identified few studies on the effectiveness of case management (KQ3 and KQ4).
    - *ClinicalTrials.gov:* We identified 13 ongoing or recently completed studies from ClinicalTrials.gov.
- Impact: The potential for impact of anew AHRQ review is high, due to a lack of guidance in this area.. A review could potentially impact practice through the development of practice guidelines and the informing of coverage decisions regarding inpatient rehabilitation. Of note, we did identify a 2012 systematic "review of reviews" that examined the methods of 38 systematic reviews of stroke rehabilitation and found that the primary studies had important flaws. This suggests that, unless there are better, more recent studies, another systematic review is unlikely to yield important new insights.
- Value: It is uncertain what the value of a new AHRQ review on this topic would be. If evidence is sufficient, the ACRM plans to create formal practice recommendations, potentially by partnering with the American Academy of Neurology.

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Introduction

About 795,000 individuals experience a stroke each year in the United States, resulting in $33 billion in costs from health care services, medications, and missed work days.[1] Similarly, about 280,000 hospitalizations and 2.2 million ED visits each year are due to traumatic brain injury (TBI),[2] and survivors may experience long-term disabilities in thinking, memory, movement, sensation and emotional functioning.[2]

Research has shown individuals with severe disabilities due to brain injury benefit from multi-disciplinary rehabilitation; however it is unclear what factors are most important in determining discharge to inpatient vs other settings, how inpatient rehabilitation compares to other settings, and whether the benefits and harms vary by individual and intervention characteristics. Furthermore, individuals with brain injuries often encounter challenges in managing their care and transitioning home after rehabilitation. Case management approaches have been shown to improve outcomes for individuals with chronic mental illness and substance use disorders, however it is unclear whether this intervention can be successfully applied in a brain injury population both during and after acute care.

Topic nominations #0691, #0692 and #0693 were received on June 30, 2016. These nominations were nominated by the American Congress of Rehabilitation Medicine (ACRM). Originally, the nominator was interested in inpatient vs. outpatient rehabilitation and case management for a wide variety of conditions. After consultation with the nominator the brief was focused on patients with TBI, stroke, and other brain injuries. We also combined the nominations, as they all focused on rehabilitation services for this population. Finally, because our search identified few studies examining the comparative effectiveness of rehabilitation in inpatient vs. other settings, we expanded the inclusion criteria to include studies examining the effectiveness of a single rehabilitation treatment setting. The questions for this nomination are:

1. For adults in acute care for new or worsening disability resulting from injury or medical event, what percentage of people are discharged to inpatient rehabilitation facility versus another rehabilitation treatment settings, and how is the destination facility related to:
    a. Rehabilitation diagnostic group (stroke, TBI, other brain injury)
    b. Severity of physical, cognitive, behavioral impairments
    c. Age
    d. Time after injury that rehabilitation services began
    e. Health care payer

2. For adults in acute care for a new or worsening disability resulting from injury or medical event, what is the comparative effectiveness of admission and treatment in an inpatient rehabilitation facility versus rehabilitation in other settings, and do outcomes vary by patient and intervention characteristics, including:
    a. Rehabilitation diagnostic group (stroke, TBI, other brain injury)
    b. Severity of physical, cognitive, behavioral impairments
    c. Age
    d. Time after injury that rehabilitation services began
    e. Duration and intensity of treatment

3. For adults who receive inpatient rehabilitation for new or worsening disability from an injury or medical event, what is the effectiveness of providing case management services as part of an interdisciplinary acute rehabilitation program, and do outcomes vary by patient characteristics including:
    a. Rehabilitation diagnostic group (stroke, TBI, other brain injury)
    b. Severity of physical, cognitive, behavioral impairments
    c. Age
    d. Scope, duration, intensity of case management services

4. For adults who receive inpatient rehabilitation for new or worsening disability resulting from injury or medical event, what is the effectiveness of providing case management at discharge as part of transition, home and community based, or long-term support service programs, and do outcomes vary by patient characteristics?
    a. Rehabilitation diagnostic group (stroke, TBI, other brain injury)
    b. Severity of physical, cognitive, behavioral impairments
    c. Age
    d. Time after inpatient rehabilitation discharge that case mgmt. services began
    e. Scope, duration, intensity of case management service model

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

Table 1. Key Questions and PICOTs "

Key Questions	1. For adults in acute care for new or worsening disability resulting from injury or medical event, what percentage of people are discharged to inpatient rehabilitation facility versus another rehabilitation treatment settings, and how is the destination facility related to: a. Rehabilitation diagnostic group (stroke, traumatic brain injury, other brain injury) b. Severity of physical, cognitive, behavioral impairments c. Age d. Time after injury that rehabilitation services began e. Health care payer	2. For adults in acute care for a new or worsening disability resulting from injury or medical event, what is the comparative effectiveness of admission and treatment in an inpatient rehabilitation facility versus rehabilitation in other settings, and do outcomes vary by patient and intervention characteristics, including: a. Rehabilitation diagnostic group (stroke, traumatic brain injury, other brain injury) b. Severity of physical, cognitive, behavioral impairments c. Age d. Time after injury e. Duration and intensity of treatment	3. For adults who receive inpatient rehabilitation for new or worsening disability from an injury or medical event, what is the effectiveness of providing case management services as part of an interdisciplinary acute rehabilitation program, and do outcomes vary by patient characteristics including: a. Rehabilitation diagnostic group (stroke, TBI, other brain injury) b. Severity of physical, cognitive, behavioral impairments c. Age d. Scope, duration, intensity of case management services	4. For adults who receive inpatient rehabilitation for new or worsening disability resulting from injury or medical event, what is the effectiveness of providing case management at discharge as part of transition, home and community based, or long-term support service programs, and do outcomes vary by patient characteristics? a. Rehabilitation diagnostic group (stroke, TBI, other brain injury) b. Severity of physical, cognitive, behavioral impairments c. Age d. Time after inpatient rehabilitation discharge that case mgmt. services began e. Scope, duration, intensity of case management service model
Population	Non-geriatric adults in acute care for new or worsening disability resulting from injury or medical event (stroke, TBI, other brain injury)	Non-geriatric adults in acute care for a new or worsening disability resulting from injury or medical event (stroke, TBI, other brain injury)	Non-geriatric adults who receive inpatient rehabilitation for new or worsening disability from an injury or medical event	Non-geriatric adults who receive inpatient rehabilitation for new or worsening disability resulting from injury or medical event
Interventions	a. Inpatient rehabilitation facility b. Long term care hospital c. Subacute rehabilitation program (eg, nursing home) d. Residential	Inpatient rehabilitation facility	Case management	Case management (eg, service coordination model, rehabilitation model, assertive community treatment team)

	rehabilitation program e. Home rehabilitation program			
Comparators	NA	a. Long term care hospital b. Subacute rehabilitation program (eg, nursing home) c. Residential rehabilitation program d. Home rehabilitation program	No case management	No case management
Outcomes	Percentage of patients discharged to each rehabilitation facility	Functional outcomes, return to home setting (vs. institutionalization), independent living, quality of life, re-hospitalizations, post-discharge survival/mortality	Functional outcomes, return to home, independent living, quality of life, re-hospitalizations, post-discharge survival/mortality	Functional outcomes, return to home, independent living, employment, quality of life, re-hospitalizations, post-discharge survival/mortality
Timing	At and after acute care discharge	At and after acute care discharge	At and after acute care discharge	At and after acute care discharge

Abbreviations: TBI=Traumatic Brain Injury

Methods

To assess topic nomination *#0691/0692/0693 Rehabilitation for TBI, Stroke, and Other Brain Injury* for priority for a systematic review or other AHRQ EHC report, we used a modified process based on established criteria. Our assessment is hierarchical in nature, with the findings of our assessment determining the need for further evaluation. Details related to our assessment are provided in Appendix A.

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 (see Appendix A).

Desirability of New Review/Duplication

We searched for high-quality, completed or in-process evidence reviews pertaining to the key questions of the nomination. Table 2 includes the citations for the reviews that were determined to address the key questions.

Impact of a New Evidence Review

The impact of a new evidence review was assessed by analyzing the current standard of care, the existence of potential knowledge gaps, and practice variation. We considered whether a new review could influence the current state of practice through various dissemination pathways (practice recommendation, clinical guidelines, etc.). See Appendix A.

Feasibility of New Evidence Review

We conducted two searches for original research in PubMed from August 2011 to August 2016. The first search looked for studies on inpatient rehabilitation vs. other treatments settings (KQ1 and KQ2). This search yielded 853 articles, so we reviewed a random sample of 200. The second search looked for studies on case management approaches to rehabilitation (KQ3 and KQ4). This search yielded 303 articles, so we reviewed them all. We also searched Clinicaltrials.gov for recently completed or in-process unpublished studies. See Appendix B for the PubMed search strategy and links to the ClinicalTrials.gov search.

Value

We assessed the nomination for value (see Appendix A). We considered whether a partner organization could use the information from the proposed evidence review to facilitate evidence-based change; or the presence of clinical, consumer, or policymaking context that is amenable to evidence-based change.

Compilation of Findings

We constructed a table outlining the selection criteria as they pertain to this nomination (see Appendix A).

Results

Appropriateness and Importance

This is an appropriate and important topic. Each year in the U.S., approximately 795,000 individuals experience a stroke,[1] and 280,000 hospitalizations are due to TBI.[2] Stroke results in approximately $33 billion in costs from health care services, medications, and missed work days each year and is a leading cause of severe long-term disability.[1] TBI has also been associated with long-term disabilities in thinking, memory, movement, sensation and emotional functioning.[2] TBI in particular has been a focus of national interest in recent years. In 2015, the CDC provided a report to Congress summarizing research on the epidemiology and rehabilitation of TBI. The report identifies gaps in evidence such as the lack of research on the effectiveness of post-acute rehabilitation and for TBI population subgroups.[3]

Desirability of New Review/Duplication

A new AHRQ evidence review would not be duplicative of an existing product. We identified evidence reviews that partially address each of the key questions; however, these reviews did not cover the full range of subpopulations and settings of interest to the nominator.

We identified 11 reviews that partially addressed the 4 key questions: 1 review[4] pertinent to KQ1, 7 reviews pertinent to KQ2,[5 6,7,8-11] 1 review pertinent to KQ3,[12] and 5 reviews pertinent to KQ4.[5,11-14] The most relevant reviews included a 2012 AHRQ review[5] on multi-disciplinary post-acute rehabilitation for moderate to severe TBI, a 2015 Cochrane review[7] on multi-disciplinary rehabilitation for acquired brain injury in adults of working age, a 2013 review on stroke rehabilitation[19], and a 2011 review[4] on selection for inpatient rehabilitation after acute stroke.

We did not identify reviews for particular sub-questions, including the percentage of patients discharged to inpatient rehabilitation vs. other settings (KQ1); determination of discharge destination by time since injury (KQ1d) or health care payer (KQ1e); effectiveness of acute care case management by severity of illness (KQ3b), age (KQ3c), or scope of services (KQ3d); and effectiveness of post-acute care case management by age (KQ4c) or time since discharge (KQd).

See Table 2, Duplication column for the systematic review citations that were determined to address the key questions.

Impact of a New Evidence Review

AThe potential for impact of a new AHRQ review is high, due to a lack of guidance in this area. A review could potentially impact practice through the development of practice guidelines and the informing of coverage decisions regarding inpatient rehabilitation. The most promising area for impact would be revision of criteria for admission to inpatient rehabilitation. Of note, we did identifya 2012 systematic "review of reviews"[15] that examined the methods of 38 systematic reviews of stroke rehabilitation and found that the primary studies had important flaws. This suggests that, unless there are better, more recent studies, another systematic review is unlikely to yield important new insights.

Feasibility of a New Evidence Review

A new evidence review is feasible; however we identified limited evidence on case management (KQ3 and KQ4).

We identified a total of 29 published studies across the key questions: 9 studies[15-23] pertinent to KQ1, 20 studies[18,24-41] pertinent to KQ2, and 3 studies[26,42,43] pertinent to KQ4. We identified no studies pertinent to KQ3. The large majority of studies we included examined inpatient treatment settings alone. Our Clinicaltrials.gov search identified an additional 13 recently completed or in-process studies potentially relevant to KQ2[44-54] and 2 in-process studies potentially relevant to KQ4.[55,56] We project there may be a total of 114 studies relevant to this nomination.

See Table 2, Feasibility column for the citations that were determined to address the key questions.

Table 2. Key questions with the identified corresponding evidence reviews and original research

Key Question	Duplication (Completed or In-Process Evidence Reviews)	Feasibility (Published and Ongoing Research)
KQ 1. For adults in acute care for new or worsening disability resulting from injury or medical event, what percentage of people are discharged to inpatient rehabilitation facility versus other rehabilitation treatment settings?	None identified.	Size/scope of review Relevant Studies Identified: 8 • Prospective cohort: 4[15-18] • Retrospective cohort: 4[19-22] Projected Total: 34 ClinicalTrials.gov None identified.
KQ 1a. How is destination facility related to diagnostic group (stroke, traumatic brain injury, other brain injury)?	Total number of completed and in-process systematic reviews: 1 • Other: 1[4]	Size/scope of review Relevant Studies Identified: 8 • Prospective cohort: 4[15-18] • Retrospective cohort: 4[19-22] Projected Total: 34 ClinicalTrials.gov None identified.
KQ 1b. How is destination facility related to severity of physical, cognitive, behavioral impairments?	Total number of completed and in-process systematic reviews: 1 • Other: 1[4]	Size/scope of review Relevant Studies Identified:7 • Prospective cohort: 4[15-18] • Retrospective cohort: 3[20-22] Projected Total: 30 ClinicalTrials.gov None identified.
KQ 1c. How is destination facility related to age?	Total number of completed and in-process systematic reviews: 1 • Other: 1[4]	Size/scope of review Relevant Studies Identified: 4 • Prospective cohort: 3[15-17] • Retrospective cohort: 1[20] Projected Total: 17 ClinicalTrials.gov None identified.
KQ 1d. How is destination facility related to time after injury that rehabilitation services began?	None identified	Size/scope of review Relevant Studies Identified: 1 • Retrospective cohort: 1[20] Projected Total: 4 ClinicalTrials.gov None identified.
KQ 1e. How is destination facility related to health care payer?	None identified.	Size/scope of review Relevant Studies Identified:1 • Retrospective cohort: 1[23] Projected Total: 4 ClinicalTrials.gov None identified.
KQ 2. For adults in acute care for a new or worsening disability resulting from injury or medical	Total number of completed and in-progress systematic reviews: 7	Size/scope of review Relevant Studies Identified: 85 • RCT: 2[24,25]

event, what is the comparative effectiveness of admission and treatment in an inpatient rehabilitation facility versus rehabilitation in other settings?	• AHRQ: 1[5] • Cochrane: 3[6,7,8] • Other: 3[9-11]	• Pre-post: 1[26] • Prospective cohort: 12[18,27-37] • Retrospective cohort: 5[29,38-41] Projected Total: ClinicalTrials.gov • Completed: 5[44-48] • Active, not recruiting: 3[49-51]
KQ 2a. Do outcomes vary by diagnostic group (stroke, traumatic brain injury, other brain injury)?	Total number of completed and in-progress systematic reviews: 7 • AHRQ: 1[5] • Cochrane: 3[6,7,8] • Other: 3[9-11]	Size/scope of review Relevant Studies Identified: 14 • Prospective cohort: 11[18,27-35,37] • Retrospective cohort: 3[38-40] Projected Total: 60 ClinicalTrials.gov • Completed: 5[44-48] • Active, not recruiting: 3[49-51]
KQ 2b. Do outcomes vary by severity of physical, cognitive, behavioral impairments?	Total number of completed and in-progress systematic reviews: 4 • AHRQ: 1[5] • Cochrane: 2[7,8] • Other: 1[11]	Size/scope of review Relevant Studies Identified: 12 • Prospective cohort: 10[18,27-33,35,37] • Retrospective cohort: 2[38,40] Projected Total: 51 ClinicalTrials.gov Completed: 1[44,47]
KQ 2c. Do outcomes vary by age?	Total number of completed and in-progress systematic reviews: 3 • AHRQ: 1[5] • Cochrane: 1[8] • Other: 1[11]	Size/scope of review Relevant Studies Identified: 7 • Prospective cohort: 6[18,29-32,37] • Retrospective cohort: 1[39] Projected Total: 30 ClinicalTrials.gov None identified
KQ 2d. Do outcomes vary by time after injury that rehabilitation services began?	Total number of completed and in-progress systematic reviews: 2 • Cochrane: 1[7] • Other: 1[11]	Size/scope of review Relevant Studies Identified: 2 • Retrospective cohort: 1[39] • Prospective cohort: 1[33] Projected Total: 9 ClinicalTrials.gov • Completed: 1[45] • Recruiting: 1[52] • Active, not recruiting: 1[53]
KQ 2e. Do outcomes vary by duration and intensity of treatment?	Total number of completed and in-progress systematic reviews: 5 • AHRQ: 1[5] • Cochrane: 2[6,7] • Other: 2[10,11]	Size/scope of review Relevant Studies Identified: 4 • RCT: 1[25] • Prospective cohort: 2[32,36] • Retrospective cohort: 1[41] Projected Total: 17 ClinicalTrials.gov • Completed: 1[46,47] • Recruiting: 1[54]

KQ 3. For adults who receive inpatient rehabilitation for new or worsening disability from an injury or medical event, what is the effectiveness of providing case management services as part of an interdisciplinary acute rehabilitation program?	Total number of completed and in-progress systematic reviews: 1 • Other: 1[12]	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 3a. Do outcomes vary by rehabilitation diagnostic group (stroke, TBI, other brain injury)?	Total number of completed and in-progress systematic reviews: 1 • Other: 1[12]	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 3b. Do outcomes vary by severity of physical, cognitive, or behavioral impairments?	Total number of completed or in-progress evidence reviews: None identified.	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 3c. Do outcomes vary by age?	Total number of completed or in-progress evidence reviews: None identified.	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 3d. Do outcomes vary by scope, duration, or intensity of case management services?	Total number of completed or in-progress evidence reviews: None identified.	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 4. For adults who receive inpatient rehabilitation for new or worsening disability resulting from injury or medical event, what is the effectiveness of providing case management at discharge as part of transition, home and community based, or long-term support service programs, and do outcomes vary by patient characteristics?	Total number of completed and in-progress systematic review: 5 • AHRQ: 1[5] • Other: 4[11-14]	Size/scope of review Relevant Studies: 3 • RCT: 1[42] • Observational: 1[26] • Retrospective cohort study: 1[43] ClinicalTrials.Gov • Recruiting: 1[55,56]
KQ 4a. Do outcomes vary by rehabilitation diagnostic group (stroke, TBI, other brain injury)?	Total number of completed and in-progress systematic reviews: 3 • Other: 3[11-13]	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 4b. Do outcomes vary by severity of physical, cognitive, or behavioral impairments?	Total number of completed and in-progress systematic reviews: 1 • Other: 1[13]	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 4c. Do outcomes vary by age?	Total number of completed or in-progress evidence reviews: None identified.	Size/scope of review None identified. ClinicalTrials.gov None identified.
KQ 4d. Do outcomes vary by the time after inpatient rehabilitation discharge that case mgmt. services began?	Total number of completed or in-progress evidence reviews: None identified.	Size/scope of review None identified. ClinicalTrials.gov None identified.

KQ 4e. Do outcomes vary by the scope, duration, or intensity of case management service model?	Total number of completed or in-progress evidence reviews: 1 • Other: 1[11]	Size/scope of review None identified. ClinicalTrials.gov None identified.

Abbreviations: KQ=Key Question; RCT=Randomized Controlled Trial

Value

It is unclear what the value of a new AHRQ review on this topic would be. A new review could educate patients, families, clinicians, administrators, payers, and policy makers on the comparative effectiveness of inpatient rehabilitation versus other approaches for individuals with stroke, TBI, or other brain injury; and of case management services. If evidence is sufficient, the nominator plans to develop formal practice recommendations, stratifying by setting, patient characteristics, and intervention characteristics, potentially by partnering with the American Academy of Neurology.

Summary of Key Findings:

- Appropriateness and importance: The nomination is both appropriate and important.
- Duplication: A new AHRQ review would not be duplicative of an existing product. We identified evidence reviews that partially address each of the key questions; however, these reviews did not cover the full range of subpopulations and settings of interest to the nominator.
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    - We identified no reviews addressing particular subquestions, including the percentage of patients discharged to inpatient rehabilitation vs. other settings (KQ1); determination of discharge destination by time since injury (KQ1d) or health care payer (KQ1e); effectiveness of acute care case management by severity of illness (KQ3b), age (KQ3c), or scope of services (KQ3d); and effectiveness of post-acute care case management by age (KQ4c) or time since discharge (KQd).
- Feasibility: A new AHRQ review is feasible; however we identified limited evidence on the effectiveness of case management.
    - *Size/scope of review:* We identified a total of 29 published studies across the key questions. The large majority of studies we included examined inpatient treatment settings. We identified few studies on the effectiveness of case management (KQ3 and KQ4).
    - *ClinicalTrials.gov:* We identified 13 ongoing or recently completed studies from ClinicalTrials.gov.
- Impact: The potential for impact of a new AHRQ review is high, due to a lack of guidance in this area. A review could potentially impact practice through the development of practice guidelines and the informing of coverage decisions regarding inpatient rehabilitation. Of note, we did identify a 2012 systematic "review of reviews" that examined the methods of 38 systematic reviews of stroke rehabilitation and found that the primary studies had important flaws. This suggests that, unless there are better, more recent studies, another systematic review is unlikely to yield important new insights.

- Value: It is uncertain what the value of a new AHRQ review on this topic would be. If evidence is sufficient, the ACRM plans to create formal practice recommendations, potentially by partnering with the American Academy of Neurology.

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Appendices

Appendix A: Selection Criteria Summary (

Appendix B: Search Strategy & Results (Feasibility)

Appendix A. Selection Criteria Summary (

Selection Criteria	Supporting Data
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, this topic represents interventions available in the U.S.
1b. Is the nomination a request for a systematic review?	Yes, this topic is a request for a systematic review.
1c. Is the focus on effectiveness or comparative effectiveness?	Yes, the focus of this review is on effectiveness.
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, it is biologically plausible. Yes, it is consistent with what is known about the topic.
2. Importance	
2a. Represents a significant disease burden; large proportion of the population	Yes, this topic represents a significant burden. Each year in the U.S., approximately 795,000 individuals experience a stroke,[1] and 280,000 hospitalizations are due to TBI.[2]
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, this topic is of high public interest. In 2015, the CDC provided a report to Congress on the epidemiology and rehabilitation of TBI. The report identified gaps in evidence, including limited evidence on the effectiveness of post-acute rehabilitation and for population subgroups.[3]
2c. Represents important uncertainty for decision makers	Yes, this topic represents important uncertainty for decision makers.
2d. Incorporates issues around both clinical benefits and potential clinical harms	Yes, this topic addresses both benefits and potential harms of rehabilitation and case management for stroke, TBI, and other brain injury.
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	Yes, stroke results in approximately $33 billion in costs from health care services, medications, and missed work days each year and is a leading cause of severe long-term disability. [1] TBI has also been associated with long-term disability. [2]
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 new AHRQ review would not be duplicative of an existing product. We identified evidence reviews that partially address each of the key questions; however, these reviews did not cover the full range of subpopulations and settings of interest to the nominator. We identified a systematic review pertaining to KQ1;[4] an AHRQ review pertaining to KQ2 and KQ3,[5] 3 Cochrane reviews [6,7] [8] pertaining to KQ2, 2 other evidence reviews[9,10] pertaining to KQ2; an evidence review[12] pertaining to KQ3 and KQ4 and 2 additional evidence reviews[13,14] pertaining to KQ4.
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 standard of care is unclear due to a lack of current guidance, particularly for TBI.[3]
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 due to a lack of current guidance.
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)	A new AHRQ review is feasible; however we identified limited evidence on the effectiveness of case management (KQ3 and KQ4). Size/scope of the review: We identified 4 prospective cohort[15-18] and 5 retrospective cohort[19-23] studies pertaining to KQ 1; 2 RCTs[24,25], one pre-post study[26], 12 prospective cohort [18,27-37] and 5 retrospective cohort[29,38-41] studies pertaining to KQ2; 1 RCT,[42] 1 observational study,[26] and 1 retrospective cohort study[43] pertaining to KQ4. We identified no studies pertinent to KQ3. Clinicaltrials.gov: We identified 5 completed[44-48], 4 active but not recruiting[49-51,53], and 4 currently recruiting[52,54-56] studies.
6. Value	
6a. The proposed topic exists within a clinical, consumer, or policy-making context that is amenable to evidence-based change	Yes, the topic exists within a clinical and policy context that is amenable to evidence-based change. Due to improvements in medical care, more patients are surviving TBI, stroke, and other brain injuries, and as a result are undergoing rehabilitation and encountering challenges in managing care following their injury.
6b. Identified partner who will use the systematic review to influence practice (such as a guideline or recommendation)	The ACRM plans to develop evidence-based guidelines if evidence is sufficient, potentially by partnering with the American Academy of Neurology.

Abbreviations: ACRM= American Congress of Rehabilitation Medicine; CDC=Centers for Disease Control and Prevention; TBI=Traumatic Brain Injury

Appendix B. Search Strategy & Results (Feasibility)

Topic: Effectiveness of rehab treatment based on service delivery program Date: August 16, 2016 Database Searched: Medline (PubMed)	
Concept	Search String
Rehabilitation	(((rehabilitation[Title/Abstract] OR rehab[Title/Abstract])) OR ("Rehabilitation"[Mesh] OR "rehabilitation" [Subheading])
AND	
Discharge	(discharge[Title/Abstract]) OR "Patient Discharge"[Mesh])
AND	
Inpatient and outpatient rehabilitation	(((((("Rehabilitation Centers"[Mesh]) OR "Hospitals"[Mesh]) OR "Inpatients"[Mesh]) OR ("Outpatients"[Mesh] OR "Outpatient Clinics, Hospital"[Mesh]))) OR ((acute rehabilitation[Title/Abstract]) OR inpatient rehabilitation[Title/Abstract]))) OR (((nursing home[Title/Abstract]) OR home rehabilitation[Title/Abstract]) OR residential rehabilitation[Title/Abstract])
NOT	
Editorials, etc.	((((("Letter"[Publication Type]) OR "News"[Publication Type]) OR "Patient Education Handout"[Publication Type]) OR "Comment"[Publication Type]) OR "Editorial"[Publication Type])) OR "Newspaper Article"[Publication Type]
Limit to last 5 years ; Human ; English	Filters activated: published in the last 5 years, Humans, English
N=858	
Systematic Review N=41	PubMed subsection “Systematic [sb]”
Randomized Controlled Trials N=270 #	Cochrane Sensitive Search Strategy for RCT’s ((((((((groups[tiab])) OR (trial[tiab])) OR (randomly[tiab])) OR (drug therapy[sh])) OR (placebo[tiab])) OR (randomized[tiab])) OR (controlled clinical trial[pt])) OR (randomized controlled trial[pt])
Other N=547	

ClinicalTrials.gov searched on August 16, 2016
101 studies found for: discharge OR acute OR inpatient | **Recruiting** | stroke OR brain injury | rehabilitation | Adult | Studies received from 08/16/2011 to 08/16/2016
https://clinicaltrials.gov/ct2/results?term=discharge+OR+acute+OR+inpatient&recr=Recruiting&type=&rslt=&age_v=&age=1&gndr=&cond=stroke+OR+brain+injury&intr=rehabilitation&titles=&outc=&spons=&lead=&id=&state1=&cntry1=&state2=&cntry2=&state3=&cntry3=&locn=&rcv_s=08%2F16%2F2011&rcv_e=08%2F16%2F2016&lup_s=&lup_e=

14 studies found for: discharge OR acute OR inpatient | **Active, not recruiting** | stroke OR brain injury | rehabilitation | Adult | Studies received from 08/16/2011 to 08/16/2016
https://clinicaltrials.gov/ct2/results?term=discharge+OR+acute+OR+inpatient&recr=Active%2C+not+recruiting&type=&rslt=&age_v=&age=1&gndr=&cond=stroke+OR+brain+injury&intr=rehabilitation&titles=&outc=&spons=&lead=&id=&state1=&cntry1=&state2=&cntry2=&state3=&cntry3=&locn=&rcv_s=08%2F16%2F2011&rcv_e=08%2F16%2F2016&lup_s=&lup_e=

67 studies found for: discharge OR acute OR inpatient | **Completed** | stroke OR brain injury | rehabilitation | Adult | Studies received from 08/16/2011 to 08/16/2016
https://clinicaltrials.gov/ct2/results?term=discharge+OR+acute+OR+inpatient&recr=Completed&type=&rslt=&age_v=&age=1&gndr=&cond=stroke+OR+brain+injury&intr=rehabilitation&titles=&outc=&spons=&lead=&id=&state1=&cntry1=&state2=&cntry2=&state3=&cntry3=&locn=&rcv_s=08%2F16%2F2011&rcv_e=08%2F16%2F2016&lup_s=&lup_e=

Topic: Case Management Approaches to Rehabilitation Outcomes Date: August 16, 2016 Database Searched: Medline (PubMed)	
Concept	Search String
Rehabilitation	((((((rehabilitation[Title/Abstract] OR rehab[Title/Abstract])))) OR ("Rehabilitation"[Mesh] OR "rehabilitation" [Subheading]))))
AND	
Case-Management	("Case Management"[Mesh]) OR ((care coordination[Title/Abstract] OR service coordination[Title/Abstract] OR case management[Title/Abstract]))
NOT	
Editorials, etc.	((((((("Letter"[Publication Type]) OR "News"[Publication Type]) OR "Patient Education Handout"[Publication Type]) OR "Comment"[Publication Type]) OR "Editorial"[Publication Type])) OR "Newspaper Article"[Publication Type]
Limit to last 5 years ; Human ; English	Filters activated: published in the last 5 years, Humans, English
N= 303	
Systematic Review N=33	PubMed subsection “Systematic [sb]”
Randomized Controlled Trials N=106	Cochrane Sensitive Search Strategy for RCT’s ((((((((groups[tiab])) OR (trial[tiab])) OR (randomly[tiab])) OR (drug therapy[sh])) OR (placebo[tiab])) OR (randomized[tiab])) OR (controlled clinical trial[pt])) OR (randomized controlled trial[pt])
Other N=164	

ClinicalTrials.gov searched on August 16, 2016
7 studies found for: rehabilitation OR rehab | **Recruiting** | case management | Adult
https://clinicaltrials.gov/ct2/results?term=rehabilitation+OR+rehab&recr=Recruiting&type=&rslt=&age_v=&age=1&gndr=&cond=&intr=case+management&titles=&outc=&spons=&lead=&id=&state1=&cntry1=&state2=&cntry2=&state3=&cntry3=&locn=&rcv_s=&rcv_e=&lup_s=&lup_e=
7 studies found for: rehabilitation OR rehab | **Active, not recruiting** | case management | Adult
https://clinicaltrials.gov/ct2/results?term=rehabilitation+OR+rehab&recr=Active%2C+not+recruiting&type=&rslt=&age_v=&age=1&gndr=&cond=&intr=case+management&titles=&outc=&spons=&lead=&id=&state1=&cntry1=&state2=&cntry2=&state3=&cntry3=&locn=&rcv_s=&rcv_e=&lup_s=&lup_e=
18 studies found for: rehabilitation OR rehab | **Completed** | case management | Adult
https://clinicaltrials.gov/ct2/results?term=rehabilitation+OR+rehab&recr=Completed&type=&rslt=&age_v=&age=1&gndr=&cond=&intr=case+management&titles=&outc=&spons=&lead=&id=&state1=&cntry1=&state2=&cntry2=&state3=&cntry3=&locn=&rcv_s=&rcv_e=&lup_s=&lup_e=