CLINICAL PRACTICE GUIDELINE FOR EVALUATION OF PSYCHOSOCIAL FACTORS INFLUENCING RECOVERY FROM ADULT ORTHOPAEDIC TRAUMA

Adopted by the American Academy of Orthopaedic Surgeons
Board of Directors
December 6, 2019

***Endorsed by*:**

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Disclaimer

This clinical practice guideline (CPG) was developed by a physician volunteer clinical practice guideline development group based on a formal systematic review of the available scientific and clinical information and accepted approaches to treatment and/or diagnosis. This clinical practice guideline is not intended to be a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. Clinical patients may not necessarily be the same as those found in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's specific clinical circumstances.

Disclosure Requirement

In accordance with AAOS policy, all individuals whose names appear as authors or contributors to this clinical practice guideline filed a disclosure statement as part of the submission process. All panel members provided full disclosure of potential conflicts of interest prior to voting on the recommendations contained within this clinical practice guideline.

Funding Source

This clinical practice guideline was funded exclusively through a research grant provided by the United States Department of Defense with no funding from outside commercial sources to support the development of this document.

FDA Clearance

Some drugs or medical devices referenced or described in this Clinical practice guideline may not have been cleared by the Food and Drug Administration (FDA) or may have been cleared for a specific use only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or device he or she wishes to use in clinical practice.

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Published 2019 by the Major Extremity Trauma and Rehabilitation Consortium (METRC) in collaboration with the American Academy of Orthopaedic Surgeons (AAOS)

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Rosemont, IL

First Edition

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SUMMARY OF RECOMMENDATIONS

FACTORS ASSOCIATED WITH PATIENT OUTCOMES

It is recommended that clinicians evaluate the following factors, as they are associated with increased biopsychosocial limitations after adult orthopaedic trauma:

- Anxiety
- PTSD
- Depression
- Premorbid psychiatric conditions
- Smoking
- Lower education level
- Less social support
- Resilience Issues (i.e. Limited self-efficacy, less effective coping strategies)

Strength of Recommendation: Moderate 

Description: Evidence from two or more "Moderate" quality studies with consistent findings recommending for or against the intervention, prognostic factor, or diagnostic test.

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INTRODUCTION

Overview/Military Application

This clinical practice guideline is based on a formal systematic review of published studies regarding evaluation of psychosocial factors influencing recovery from adult orthopaedic trauma. In addition to providing clinical practice recommendations, this guideline also highlights limitations of the current literature and areas that require future research. This clinical practice guideline addresses psychosocial factors influencing clinical, functional, and quality of life recovery following military and civilian adult orthopaedic trauma.

This guideline is intended to be used by all qualified and appropriately trained clinicians and surgeons involved in the management of adult orthopaedic trauma. It is also intended to serve as an information resource for decision makers and developers of practice guidelines and recommendations.

Although military personnel operate in the broader context of society, military service members exhibit a unique psychosocial profile that should be considered following orthopaedic injury (Strom, 2012, Kennedy, 2007). During the last decade, the disparity between civilians and active duty members has been highlighted in the literature and the concept of the military as a sub-culture has emerged (Strom, 2012, Reger, 2008, Christian, 2009). Information contained in a 2011 Pew Research poll revealed that less than 0.5% of the general population has served on active duty in the previous ten years of sustained combat. In addition, both military veterans (84%) and civilians (71%) agree that the public does not fully understand the psychosocial problems facing the military service member, highlighting the necessity of addressing the issue (Taylor, 2011).

Relative to previous major combat engagements, combat deaths sustained in Afghanistan and Iraq, (Afghanistan: Operation Enduring Freedom (OEF) / Iraq: Operation Iraqi Freedom (OIF)) have decreased from 33% to approximately 4.6% (Amoroso, 1999, Belmont, 2010). Thus, combat deployed service members are more likely to survive combat in this era than in any other previous era (Belmont, 2010). Due to increased casualty survival rates there are increased rates of limb injuries to address among servicemembers who may have previously died. Given the extent of extremity injuries among U.S. military personnel, it is critical to reduce disability, costs, and lost-duty days associated with these injuries while enhancing clinical, functional, and quality of life outcomes. Research-informed clinical decision making via the integration of science and practice leads to optimal post-orthopaedic outcomes.

Goals and Rationale

The purpose of this clinical practice guideline is to improve outcomes following orthopaedic trauma by evaluating, and addressing, the psychosocial factors that impact these outcomes. Clinicians should actively address presence of psychosocial risk factors appropriately. However, this guideline did not evaluate effective treatment strategies for psychosocial factors. The recommendations included in this report are based on a formal systematic review of the available literature regarding psychosocial factors influencing recovery from adult orthopaedic trauma that

was completed by AAOS staff using a rigorous, standardized process that was conducted between November 2018 and July 2019. The AAOS staff along with a work group consisting of civilian and military interdisciplinary experts in orthopaedic surgery, physical medicine, pain medicine, emergency medicine, psychiatry, biostatistics, rehabilitation psychology, and public health systematically reviewed the available literature and subsequently developed the following recommendations based on a rigorous, standardized process.

The biopsychosocial model is the guiding theoretical model for the guideline (Engel, 1980). The model recognizes that each of the major domains (biological, psychological, social) are all contributing to the recovery process and long-term outcomes following adult orthopaedic trauma. Orthopaedic trauma care involves multiple providers and ideally is conducted in an interdisciplinary environment. This guideline was created as a tool to guide surgeons and other clinicians and team members in conducting a comprehensive evaluation following trauma that includes assessment of psychosocial factors that influence recovery. This guideline should not be construed as addressing all aspects of psychosocial care. Rather it is an evidence-based guide on the psychosocial factors to be evaluated in the recovery trajectory. The ultimate judgment regarding any specific evaluation or subsequent treatment must be made in light of all patient circumstances and the needs and resources particular to the locality or institution.

Intended Users

This guideline is intended to be used by all qualified and appropriately trained members of an adult orthopaedic trauma interdisciplinary treatment team, which includes, but is not limited to surgeons, physicians, physician extenders, nurses, physical/occupational therapists, and behavioral health providers.

Patient Population

This document addresses the evaluation of psychosocial factors influencing recovery from military and civilian adult orthopaedic trauma. The information in this guideline cannot be fully extrapolated to the treatment of children or adolescents.

Burden of Disease

Globally, musculoskeletal trauma continues to be a leading cause of mortality and disability (Haagsma, 2013). In the United States, trauma is among the leading causes of death and disability, accounting for over 2 million hospital admissions annually (Murray, 2013, Kochanek, 2018, Finkelstein, 2006). The impact of traumatic injury extends far beyond the initial hospitalization. Injury survivors often continue to experience physical and psychological challenges for years following the initial event (Alghnam, 2015, Halcomb, 2005, Marshall, 2010).

In a military combat deployed setting, pre-OIF/OEF extremity trauma prevalence rates are significant, comprising 58% to 88% of all injuries since the Korean War (Hardaway, 1978, Islinger, 2000, Reister, 1973). Combat operations during OEF and OIF exhibited similar numbers of extremity wounds and fractures, accounting for approximately 54% of all wounds (Cross, 2011, Owens, 2007). Combat-related extremity injuries are extremely costly, accounting

for approximately two-thirds of initial hospitalization costs and estimated disability payments (Cross, 2011, Masini, 2009).

Risk Factors and Emotional/Physical Impact

Anxiety, post-traumatic stress disorder (PTSD), depression, premorbid psychiatric conditions, smoking, lower education level, less social support, and resilience issues (i.e., limited self-efficacy, less effective coping strategies) are assessed in this guideline as being associated with a higher likelihood of biopsychosocial limitations after adult orthopaedic trauma.

Age, Body Mass Index (BMI), race/ethnicity, gender, low income, lack of employment, comorbidities, pre-injury exposure to combat related circumstances are other factors assessed in this guideline that may be associated with greater biopsychosocial symptom intensity, magnitude of limitations, and/or diminished health related quality of life.

Potential Benefits, Harms, and Contraindications

The psychosocial evaluation recommended in this guideline focuses on factors that have modest evidence for influencing patient outcomes in multiple domains. Potential benefits of evaluation of psychosocial factors influencing recovery from military and civilian adult orthopaedic trauma include identification of barriers to recovery and early referral for treatment. There appears to be low risk of harm in evaluating psychosocial risk factors. Support for how best to screen/evaluate for these factors and their effects is limited and requires further study. Barriers to psychosocial evaluation include, but are not limited to, lack of resources to properly assess the risk factor and impediments to patient response (e.g. cognitive deficits and patient refusal to participate).

Future Research

Current evidence regarding mental and social health influences on recovery from injury consists largely of correlations and associations with a few preliminary studies of treatment interventions. As documented in this report, there is consistent, compelling, and increasing evidence that mental and social health are associated with symptom intensity and magnitude of limitations after adult orthopedic trauma injuries. Studies of general traumatic injuries do not always stratify by the specific orthopaedic population, which leaves gaps in the evidence for future research to address.

Next steps and areas for additional investigation include:

1. The optimal strategies for identifying mental and social health opportunities.
    a. The following may have a role:
        i. Questionnaires
        ii. Monitoring for verbal and non-verbal signs
        iii. Identification of greater symptoms and limitations than expected for a given injury and stage of recovery as measured on patient reported outcome measures (PROMs)
        iv. Formal interviews.
    b. What is the optimal timing and frequency of screening?
    c. When is it appropriate to stop screening?

2. The relative benefits and harms of routine screening and tailored treatment.
3. The effectiveness of various interventions.
4. Economic analysis of the actual or potential benefits of screening and treatment with respect to optimal stewardship of resources.
5. Assessment of the relationship between barriers to screening (condition, access, electronic health records, referral methods, etc.) and their impact on a patient's ability to respond to evaluation, seek treatment, or recover from injury
6. Determining to whom/when specialty referral is needed for trauma-associated factors

Barriers to investigation in this area include the following:

1. Altered consciousness or cognitive capacity
2. Potential for problems arising from screening with no access or delayed access to treatment resources, or inadequate quality/training for mental and social health aspects of recovery from adult orthopedic trauma.
3. Ethical issues associated with no screening given that cognitive, emotional, and social aspects of recovery are to be expected based on human illness behavior.
4. Ethical issues associated with no treatment given the evidence that cognitive behavioral therapy and its derivatives (as well as psychotherapy and medication) are effective at alleviating stress and psychological distress and fostering optimal cognitive coping strategies.

METHODS

The methods used to perform this systematic review were employed to minimize bias and enhance transparency in the selection, appraisal, and analysis of the available evidence. These processes are vital to the development of reliable, transparent, and accurate clinical recommendations. To view the full AAOS clinical practice guideline methodology please visit https://www.aaos.org/additonalresources/ .

This clinical practice guideline evaluates the association of psychosocial factors to patient outcomes. The AAOS approach incorporates practicing physicians (clinical experts) and methodologists who are free of potential conflicts of interest relevant to the topic under study, as recommended by clinical practice guideline development experts.[1]

This clinical practice guideline was prepared by the AAOS Psychosocial Factor Clinical Practice Guideline physician development group (clinical experts) with the assistance of the AAOS Clinical Quality and Value (CQV) Department (methodologists). To develop this clinical practice guideline, the clinical practice guideline development group held an introductory meeting on October 3, 2018 to establish the scope of the clinical practice guideline. As the physician experts, the clinical practice guideline development group defined the scope of the clinical practice guideline by creating PICO Questions (i.e. population, intervention, comparison, and outcome) that directed the literature search. The AAOS Medical Librarian created and executed the search (see Appendix III for search strategy).

Literature Searches

The medical librarian conducted a comprehensive search of MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials based on key terms and concepts from the clinical practice guideline development group's PICO questions (Appendix II). Bibliographies of relevant systematic reviews were hand searched for additional references. All databases were last searched on January 4, 2019 with limits for publication dates from 1990 to present and English language. The full search strategies are reported in Appendix III.

Defining the Strength of Recommendation

Judging the level of evidence is only a steppingstone towards arriving at the strength of a clinical practice guideline recommendation. The level of evidence (Table 1) also takes into account the quality, quantity, and the trade-off between the benefits and harms of a treatment, the magnitude of a treatment's effect, feasibility, accessibility, and whether there is data on critical outcomes. Table 2 addresses how to interpret the strength of each recommendation.

Voting on the Recommendations

The recommendations and their strength were voted on by the guideline development group members during the final meeting. If disagreement between the guideline development group occurred, there was further discussion to see whether the disagreement(s) could be resolved. Recommendations were approved and adopted in instances where a simple majority (60%) of the guideline development group voted to approve; however, the guideline development group had consensus (100% approval) when voting on every recommendation for this guideline.

Interpreting the Strength of Evidence

Table I. Level of Evidence Descriptions

Strength of Recommendation	Overall Strength Of Evidence	Description of Evidence quality	Strength Visual
Strong	**Strong**	Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework	
Moderate	**Moderate or Strong**	Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.	
Limited	**Limited, Moderate or Strong**	Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.	
Consensus	**No reliable evidence**	There is no supporting evidence, or higher quality evidence was downgraded due to major concerns addressed in the EtD framework. In the absence of reliable evidence, the guideline work group is making a recommendation based on their clinical opinion.	

Table II. Interpreting the Strength of a Recommendation

Strength of Recommendation	Patient Counseling (Time)	Decision Aids	Impact of Future Research
Strong	Least	Least Important, unless the evidence supports no difference between two alternative interventions	Not likely to change
Moderate	Less	Less Important	Less likely to change
Limited	More	Important	Change possible/anticipated
Consensus	Most	Most Important	Impact unknown

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Review Period

Following the final meeting, the CPG draft undergoes a 3-week review period for additional input from external content experts. Written comments are provided on the structured review form. All reviewers are required to disclose their conflicts of interest.

To guide who participates, the CPG work group identifies specialty societies at the introductory meeting. Organizations, not individuals, are specified.

The specialty societies are solicited for nominations of individual reviewers approximately six weeks before the final meeting. The review period is announced as it approaches, and others interested are able to volunteer to review the draft. The chairs of the guideline work group review the draft of the guideline prior to dissemination.

Some specialty societies (both orthopaedic and non-orthopaedic) ask their evidence-based practice (EBP) committee to provide review of the guideline. The organization is responsible for coordinating the distribution of our materials and consolidating their comments onto one form. The chair of the external EBP committees provides disclosure of their conflicts of interest (COI) and manages the potential conflicts of their members.

Again, the AAOS asks for comments to be assembled into a single response form by the specialty society and for the individual submitting the review to provide disclosure of potentially conflicting interests. The review stage gives external stakeholders an opportunity to provide evidence-based direction for modifications that they believe have been overlooked. Since the draft is subject to revisions until its approval by the AAOS Board of Directors as the final step in the guideline development process, confidentiality of all working drafts is essential.

The CPG is also provided to members of the AAOS Board of Directors (BOD), members of the Council on Research and Quality (CORQ), members of the Board of Councilors (BOC), and members of the Board of Specialty Societies (BOS) and members of the Committee on Evidence-Based Quality and Value (EBQV) for review and comment. The CPG is automatically forwarded to the AAOS BOD and CORQ so that they may review it and provide comment prior to being asked to approve the document. Members of the BOC and BOS are solicited for interest. If they request to see the document, it is forwarded to them for comment. Based on these bodies, over 200 commentators have the opportunity to provide input into each CPG.

The chairs of the guideline work group and the manager of the AAOS CQV unit drafts the initial responses to comments that address methodology. These responses are then reviewed by the chair and co-chair, who respond to questions concerning clinical practice and techniques. The Senior Manager of Clinical Quality and Value may provide input as well. All comments received and the initial drafts of the responses are also reviewed by all members of the guideline development group. All proposed changes to recommendation language as a result of the review period are based on the evidence. Final revisions are summarized in a report that is provided alongside the guideline document throughout the remainder of the approval processes and final publication.

The AAOS believes in the importance of demonstrating responsiveness to input received during the review process and welcomes the critiques of external specialty societies. Following final approval of the guideline, all individual responses are posted on our website http://www.aaos.org/quality with a point-by-point reply to each non-editorial comment. Reviewers who wish to remain anonymous notify the AAOS to have their names de-identified; their comments, our responses, and their COI disclosures are still posted.

The AAOS CPG Approval Process

This final clinical practice guideline draft must be approved by the AAOS Committee on Evidence Based Quality and Value Committee, and subsequently the AAOS Council on Research and Quality, and the AAOS Board of Directors. These decision-making bodies are described in the PRF CPG eAppendix. Their charge is to approve or reject its publication by majority vote.

Revision Plans

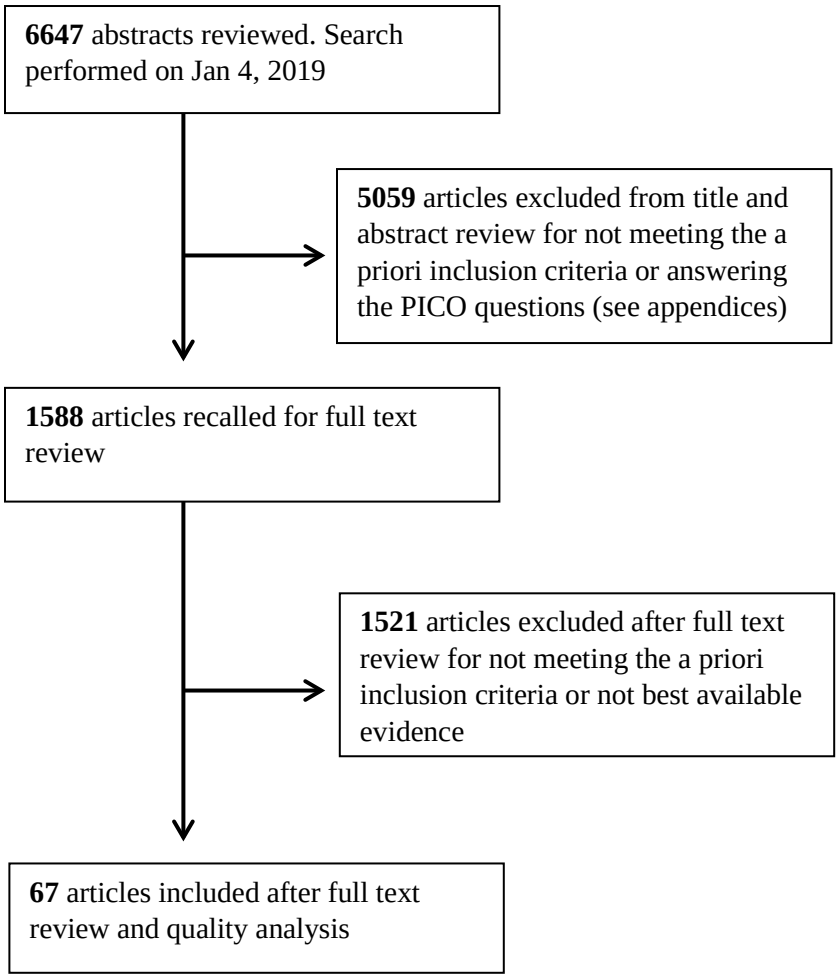
This clinical practice guideline represents a cross-sectional view of current treatment and may become outdated as new evidence becomes available. This clinical practice guideline will be revised in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology. This clinical practice guideline will be updated or withdrawn in five years.

CPG Dissemination Plans

The primary purpose of the present document is to provide interested readers with full documentation of the best available evidence for various procedures associated with the topic of this review. Publication of most clinical practice guidelines is announced by an Academy press release, articles authored by the clinical practice guideline development group and published in the Journal of the American Academy of Orthopaedic Surgeons, and articles published in AAOS *Now*. Most clinical practice guidelines are also distributed at the AAOS Annual Meeting in various venues such as on Academy Row and at Committee Scientific Exhibits. The final guideline recommendations and their supporting rationales will be hosted on www.OrthoGuidelines.org.

Selected clinical practice guidelines are disseminated by webinar, an Online Module for the Orthopaedic Knowledge Online website, Radio Media Tours, Media Briefings, and by distributing them at relevant Continuing Medical Education (CME) courses and at the AAOS Resource Center.

Study Attrition Flowchart



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RECOMMENDATIONS

Factors Associated with Patient Outcomes

It is recommended that clinicians evaluate the following factors, as they are associated with increased biopsychosocial limitations after adult orthopaedic trauma:

- Anxiety
- PTSD
- Depression
- Premorbid psychiatric conditions
- Smoking
- Lower education level
- Less social support
- Resilience Issues (i.e. Limited self-efficacy, less effective coping strategies)

Strength of Recommendation: Moderate 

Description: Evidence from two or more "Moderate" quality studies with consistent findings recommending for or against the intervention, prognostic factors, or diagnostic test.

Rationale

This recommendation was derived from data regarding the association between psychosocial factors and patient outcomes. Clinicians should actively address the presence of these factors appropriately. However, this guideline did not evaluate effective treatment strategies for psychosocial factors.

Anxiety

Studies meeting criteria for this analysis which indicate anxiety is a factor associated with worsened biopsychosocial outcomes in orthopaedic trauma are few, with just one recent high quality retrospective observational study of 601 patients (Castillo, 2013) indicating that increased anxiety at six and twelve-months post-injury is associated with increased anxiety and pain at 18 and 24 months. Additional low quality studies and two moderate quality studies (Bosma, 2004, O'Toole, 2008) also support this association. Research studies have used the Brief Symptom Inventory (BSI) Anxiety Scale (Anxiety) and the Hospital Anxiety and Depression Scale (HADS) to screen and diagnose anxiety respectively.

Depression

One high quality study (Castillo, 2013) found that increased depression at 6 months leads to increased depression at 12 months, and increased depression at 12 months leads to increased depression at 24 months. Increased scores on the Brief Symptom Inventory (BSI) Depression Scale are associated with decreased functional outcomes (Wegener, 2011). Two moderate quality studies (Papadakaki, 2017, Bosma, 2004) suggested depressive symptoms at baseline with the Center for Epidemiologic Studies Depression Scale (CES – D) greater than or equal to 16 are

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associated with higher odds of depression at 6 months and with post-treatment depression at 1 year; both studies showed associated negative patient outcomes. Two moderate quality studies (Hou, 2013, O'Toole, 2008) suggested higher Brief Symptom Rating Scale (BSRS-5) scores are associated with lower EQ-5D Quality of Life (QOL) and decreased odds of satisfaction; both were associated with negative patient outcomes. However, two moderate quality studies (Nota, 2015, Rivara, 2008) also found depression measured by CES - D and depression before injury was found to be significantly associated with patient outcomes in bivariate analysis. Five low quality studies (Wegner, 2011, Schweininger, 2015 [HADS depression at 3 months and worse depression at 12 months]; Zatzick, 2007, Zatzick, 2008, Archer, 2015) found depression by a variety of measures is associated with negative patient outcomes, and there were no studies that found depression to be associated with positive outcomes.

PTSD

Three low quality (Scweininger, 2015, Zatrzick, 2010, Liedl, 2010) and one moderate quality study (Papadakaki, 2017) found a significant association between PTSD and negative patient outcomes including pain, function, anxiety, depression, mental health, and return to activity/work. One study (Schweininger, 2015) showed a significant relationship with PTSD 3 months after the traumatic injury to be related to negative outcomes 12 months after injury. Only one moderate quality study (Nota, 2015) of 130 patients found a significant relationship between PTSD and patient outcomes in bivariate analyses, and there were no studies showing an association of PTSD to positive outcomes.

Pre-morbid psychiatric conditions

In the literature there are existing studies examining the relationship between pre-morbid psychiatric conditions and negative patient outcomes in adult orthopaedic trauma. In these studies, pre-morbid psychiatric conditions included either a specific condition, including PTSD, or the presence of *any* psychiatric medical comorbidity. In a low quality study by Zatzick (2007), pre-injury psychiatric diagnoses abstracted from the medical chart were adjusted for in the statistical analysis (including alcohol/substance use, depression, etc.). PTSD and depression post-injury remained independently associated with elevated odds of impairment in activity of daily living (ADL or IADL), reduced physical and mental health, and lost productivity. In another low quality study by Shields (2015), the presence of any pre-injury psychiatric history was associated with lower odds of having a satisfactory Physical Components Summary Score and Mental Components Summary Score as measured by the SF-12. Additionally, the study found any pre-morbid psychiatric history was associated with lower odds of a satisfactory Simple Shoulder Test. However, the association between pre-injury psychiatric diagnosis and a satisfactory Disabilities of the Arm, Shoulder, and Hand (DASH) Score was not significant.

One low quality study examined pre-injury psychiatric diagnosis in a military population of 772 individuals and found the presence of a pre-injury psychiatric diagnosis is associated with higher odds of developing PTSD as well as higher odds of substance abuse (Melcer, 2013).

Smoking

This assessment included three low quality (MacKenzie, 2005, Bosse, 2002, Castillo, 2011) and two moderate quality (MacKenzie, 2004/2006) articles that found a significant relationship between smoking and negative patient outcome including sickness impact profile (SIP), function, mental health, and return to work. The studies assessed smoking as currently smoking compared to non-smoker as well as continuously and categorically for number of cigarettes smoked. There was one low quality study of 154 patients (Shields, 2015) that did not find an association between smokers and patient outcomes. However, there were no studies that found smoking to be related to positive patient outcomes.

Lower education level

One high quality (Hou, 2012), six moderate quality (Bosma Hans, 2004, Holtslag, 2007, Kugelman, 2018, MacDermid, 2002, MacKenzie, 2004/2006) and nine low quality (Archer, 2015, Bosse, 2002, Castillo, 2011, Clay, 2010, MacKenzie, 1998/2005, Pezzin, 2000, Soberg, 2007/2012) articles found a significant association between higher education levels and improved patient outcomes. Outcomes included pain, quality of life, return to activity/work, mental health, function, anxiety, and overall SIP score. There were an additional five moderate quality (Hou, 2013, Nota, 2015, O'Toole, 2008, Papadakaki, 2017, Walsh, 2010) and six low quality (Andrew, 2008/2012, Hou, 2008, Ouellet, 2009, Ponsford, 2008, Soberg, 2011) articles that found no significant relationship. However, a majority of the articles favored higher education for improved outcomes, and none of the articles favored lower education levels for positive outcomes. Though the included literature was not entirely consistent in favor of higher education, there were no studies that showed lower education levels to be related to positive outcomes.

Less social support

A high quality study (Hou, 2012) compared return to work outcomes in married versus single, divorced or widowed patients. Return to work time was found to be slow in single, divorced or widowed patients and average to fast in married patients. One moderate strength study (Papadakaki, 2017) found divorced and widowed patients had higher odds of depression compared to single patients at six months.

There were also low quality studies (Bosse, 2002, Castillo, 2011) demonstrating an association of lower overall SIP scores and higher social support scores. Additionally, a low quality study (Soberg, 2012) found better SF-36 scores at the five-year mark for those with higher levels of societal participation, and another study (Ouellet, 2009) found greater social support decreases the risk of poor mental health in trauma patients. Compared to patients with low social functioning, those with higher social functioning had less time off from work according to a low quality study (Clay, 2010), and another study (Soberg, 2012) found higher social functioning is associated with higher probability of return to work.

Resilience Issues (i.e. Limited self-efficacy, less effective coping strategies)
Two moderate (Hou, 2013, Schnyder, 2001b) and four low quality (Ni, 2013, Soberg, 2010/2012, Tuncay, 2015) studies assessing varying coping strategies found positive patient outcomes significantly associated with more effective coping. Outcomes with significant association included quality of life, function, PTSD, mental health, and varying levels of post-traumatic growth.

Six moderate quality (Walsh, 2016, MacKenzie, 2006, Rusch, 2003, Bosma, 2004, Schnyder, 2001b, Schnyder, 2003) and ten low quality (Hou, 2008, Vranceanu, 2014, Clay, 2010, Steven, 2010, MacKenzie, 2004/2005, Archer, 2015, Bosse, 2002, Castillo, 2011, Bot, 2011) studies showed significant associations between negative patients outcomes and negative personal view (catastrophic thinking, low self-efficacy, low resiliency, etc.). Two additional studies (Hou, 2013, O'Toole, 2008) found significant associations at the bivariate level between personal view and patient outcomes, and no studies were found to favor negative personal view for positive patient outcomes.

Other considerations:
Note the following factors may be associated with greater biopsychosocial symptom intensity, magnitude of limitations, and/or diminished health related quality of life:

- Age
- BMI
- Race
- Gender
- Low income
- Lack of employment
- Comorbidities
- Pre-injury exposure to combat related circumstances

Several low quality studies have demonstrated that increasing age at the time of injury leads to: higher disability (Mackenzie, 2005), lower SF-12 physical scores (Andrew, 2008), higher pain (Ponsford, 2008), and lower return to work rates (MacKenzie, 2006, Pezzin, 2000). One moderate quality study (MacKenzie, 2004) demonstrated better SIP scores in amputation patients older than 55 years old.

There is moderate evidence (Walsh, 2010) that increasing BMI in musculoskeletal injuries is related to increased pain. Race and gender may also be associated with greater biopsychosocial symptom intensity, magnitude of limitations, and/or diminished health related quality of life. There are abundant data that race disparities exist in the care of musculoskeletal injuries, however, no objective data exist to support a recommendation with regard to race or gender. Two moderate quality studies (Kugelman, 2018, MacKenzie, 2004) and three low quality studies (Soberg, 2012, Ouellet, 2009, MacKenzie, 2006) failed to demonstrate a significant relationship between employment type (blue collar vs white collar), employment status (employed vs unemployed), or income at or below poverty level with physical or mental health symptoms after

injury. One low quality study (Bosse, 2002) suggested that income at/below poverty level predicted lower % change in SIP score, and another low quality study (Hebert, 2006), demonstrated that pre-injury income of >$75,000 was associated with higher likelihood of return to work.

Three moderate quality studies (Holtslag, 2007, Abraham, 2014, MacKenzie, 2004) demonstrated that co-morbidity is an independent predictor of long-term functional consequences including higher overall SIP scores.

In military and veteran populations, one low quality study (Gunawardena, 2007) demonstrated that war/combat exposures (i.e., being shot at, being threatened with arms, or witnessing war-related violence) predicted greater psychological distress after physical trauma.

Benefits/Harms of Implementation

There appears to be low risk of harm in evaluating the presence or absence of psychosocial factors. Support for how best to screen/evaluate for these factors and their effects is limited and requires further study.

Future Research

Current evidence regarding mental and social health influences on recovery from injury consists largely of correlations and associations with a few preliminary studies of treatment interventions. As documented in this report, there is consistent, compelling, and increasing evidence that mental and social health are associated with symptom intensity and magnitude of limitations after adult orthopedic trauma injuries. Studies of general traumatic injuries do not always stratify by the specific orthopaedic population, which leaves gaps in the evidence for future research to address.

Next steps and areas for additional investigation include:

1. The optimal strategies for identifying mental and social health opportunities
    a. The following may have a role:
        i. Questionnaires
        ii. Monitoring for verbal and non-verbal signs
        iii. Identification of greater symptoms and limitations than expected for a given injury and stage of recovery as measured on patient reported outcome measures (PROMs)
        iv. Formal interviews.
    b. What is the optimal timing and frequency of screening?
    c. When is it appropriate to stop screening?
2. The relative benefits and harms of routine screening and tailored treatment
3. The effectiveness of various interventions
4. Economic analysis of the actual or potential benefits of screening and treatment with respect to optimal stewardship of resources

5. Assessment of the relationship between barriers to screening (condition, access, EHR, referral methods, etc.) and their impact on a patient's ability to respond to evaluation, seek treatment, or recover from injury
6. Determining to whom/when specialty referral is needed for trauma-associated factors

Barriers to investigation in this area include the following:

1. Altered consciousness or cognitive capacity
2. Potential for problems arising from screening with no access or delayed access to treatment resources, or inadequate quality/training for mental and social health aspects of recovery from adult orthopedic trauma.
3. Ethical issues associated with no screening given that cognitive, emotional, and social aspects of recovery are to be expected based on human illness behavior.
4. Ethical issues associated with no treatment given the evidence that cognitive behavioral therapy and its derivatives (as well as psychotherapy and medication) are effective at alleviating stress and psychological distress and fostering optimal cognitive coping strategies.

APPENDICES

Appendix I: References for Included Literature

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Appendix II - Guideline Development Group Disclosures

Prior to the development of this clinical practice guideline, clinical practice guideline development group members disclose conflicts of interest (COI). They disclose COIs in writing to the American Academy of Orthopaedic Surgeons via a private on-line reporting database and also verbally at the recommendation approval meeting.

Disclosure Items: (n) = Respondent answered 'No' to all items indicating no conflicts. 1 = Royalties from a company or supplier; 2 = Speakers bureau/paid presentations for a company or supplier; 3A = Paid employee for a company or supplier; 3B = Paid consultant for a company or supplier; 3C = Unpaid consultant for a company or supplier; 4 = Stock or stock options in a company or supplier; 5 = Research support from a company or supplier as a PI; 6 = Other financial or material support from a company or supplier; 7 = Royalties, financial or material support from publishers; 8 = Medical/Orthopaedic publications editorial/governing board; 9 = Board member/committee appointments for a society.

Non-Voting Oversight Chairs' and Voting Members' Disclosures

Oversight Chair – Non-Voting Members
Julie Samora, MD. MPH, PhD
Julie B Samora, MD, MPH, PhD Submitted on: 04/05/2019
AAOS: Board or committee member ($0)
American Society for Surgery of the Hand: Board or committee member ($0)
Globus Medical: Paid consultant ($10,000) Walter Samora (husband) paid consultant(Family)
Pediatric Orthopaedic Society of North America: Board or committee member ($0) Committee member(Self)
Ruth Jackson Orthopaedic Society: Board or committee member ($0)

Work Group – Voting Members
Stephen Wegener, MA, PhD
Stephen Wegener Submitted on: 06/20/2019
Springer: Publishing royalties, financial or material support ($0)

Benjamin Keizer, PhD
Benjamin Keizer, PhD (This individual reported nothing to disclose); Submitted on: 10/04/2018

Erik Ensrud, MD
Erik Ensrud, MD Submitted on: 07/02/2018
American Academy of Neuromuscular and Electrodiagnostic Medicine: Board or committee member ($0) Chair,
Neuromuscular Self Assessment Exam Committee(Self)
American Academy of Physical Medicine and Rehabilitation: Board or committee member ($0) Chair, Pain/Neuromuscular Committee(Self)
Muscle and Nerve/Wiley: Editorial or governing board ($0) Editorial Board(Self)
Osler Medical Institute: Publishing royalties, financial or material support ($4,400) Speaker honorarium and online course publication (2017 amount listed, 2018 will be less ~$3000)(Self)

David Benedek, MD
David Benedek, MD Submitted on: 09/10/2018

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Allergan INC: Stock or stock Options Number of Shares: 50 N/A(Both)
Amgen Co: Stock or stock Options Number of Shares: 50 N/A(Both)

Ann Marie Warren, PhD
Ann Marie Warren, PhD Submitted on: 10/19/2018
Orthopaedic Trauma Association: Board or committee member ($0)

Todd Allen Swenning, MD
Todd Allen Swenning, MD Submitted on: 06/18/2019
AAOS: Board or committee member ($0)
Conventus: Paid consultant ($0)
IMAHelps Medical Mission Brigade: Board or committee member ($0)
Mallinckrodt Pharmaceuticals: Paid presenter or speaker ($0) Number of Presentations: 0
Orthopaedic Trauma Association: Board or committee member ($0)
Stryker: Paid consultant ($0)

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David C Ring, MD Submitted on: 04/10/2019
AAOS: Board or committee member ($0) Chair, Patient Safety Committee(Self)
Clinical Orthopaedics and Related Research: Editorial or governing board ($5,000) (Self)
Journal of Orthopaedic Trauma: Editorial or governing board ($0) (Self)
Orthopaedic Trauma Association: Board or committee member ($0) Research Committee(Self)
Skeletal Dynamics: IP royalties ($10,000) Royalties for Elbow Device(Self)
Wright Medical Technology, Inc.: IP royalties ($5,000) Royalties for Elbow Plates(Self)

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Kelly L Cozza, MD (This individual reported nothing to disclose); Submitted on: 09/06/2018

Wade T Gordon, MD
Wade T Gordon, MD Submitted on: 04/22/2019
AAOS: Board or committee member ($0)
Orthofix, Inc.: Paid presenter or speaker ($4,000) Number of Presentations: 2 None(Self)
Orthopaedic Trauma Association: Board or committee member ($0)

Saloni Sharma, MD
Saloni Sharma, MD (This individual reported nothing to disclose); Submitted on: 08/03/2018

Peggy L Naas, MD, MBA
Peggy L Naas, MD, MBA Submitted on: 08/17/2018
AAOS: Board or committee member ($0)
American Society of Anesthesiologists, Steering Committee, Perioperative Surgical Home Collaborative: Board or committee member ($0)
University of Minnesota Department of Orthopaedic Surgery, Liaison, Orthopaedic Surgeon Well-being Project: Board or committee member ($0)

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Appendix III: PICO Questions Used to Define Literature Search

1. In adult (>17) patients with orthopaedic trauma injuries, what psychosocial risk/protective factors are associated with which patient outcomes?

2. In adult (>17) patients with orthopaedic trauma injuries, what psychosocial screening tools are most effective in measuring or identifying key risk and protective factors?

3. In adult (>17) patients with orthopaedic trauma injuries, what is the optimal time to screen and how often is psychosocial screening necessary?

4. In adult (>17) military personnel or first responders without a diagnosis of an orthopaedic trauma injury, what psychosocial risk/protective factors are associated with which post-orthopaedic injury outcomes?

5. In adult (>17) patients with trauma injuries, what barriers/challenges are associated with implementation of psychosocial screening?

Appendix IV: Literature Search Strategy

Database: MEDLINE and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) 1946 to present
Interface: Ovid (http://ovidsp.ovid.com/autologin)
Date Searched: Jan. 4, 2019

LINE	SEARCH SYNTAX
1	((animals not humans) or cadaver).sh. or cadaver*.ti.
2	(((comment or editorial or letter or historical article) not "clinical trial") or address or news or newspaper article or case reports).pt. or case report.ti.
3	((Adolescent OR Child OR Infant) NOT Adult).sh.
4	1 or 2 or 3
5	"Wounds and Injuries".sh. or exp "Amputation, Traumatic"/ or exp "Fractures, Bone"/ or exp "Ankle Fractures"/ or exp "Femoral Fractures"/ or exp "Fracture Dislocation"/ or exp "Fractures, Avulsion"/ or exp "Fractures, Closed"/ or exp "Fractures, Comminuted"/ or exp "Fractures, Compression"/ or exp "Fractures, Malunited"/ or exp "Fractures, Multiple"/ or exp "Fractures, Open"/ or exp "Humeral Fractures"/ or exp "Intra-Articular Fractures"/ or exp "Radius Fractures"/ or exp "Shoulder Fractures"/ or exp "Spinal Fractures"/ or exp "Tibial Fractures"/ or exp "Ulna Fractures"/ or exp "Radius Fractures"/ or exp "Spinal Injuries"/ or exp "Blast Injuries"/ or exp "Crush Injuries"/ or exp "Hand Injuries"/ or exp "Hip Injuries"/ or exp "Joint Dislocations"/ or exp "Leg Injuries"/ or exp "Multiple Trauma"/ or exp "Shock, Traumatic"/ or exp "Spinal Cord Injuries"/ or exp "War-Related Injuries"/ or (trauma or traumatic or polytrauma).ti,ab.
6	("Interviews as Topic" or "Surveys and Questionnaires" or "Self-Assessment" or "Social Support" or "Health Surveys" or "Adaptation, Psychological" or "Adaptation, Physiological").sh. or (screening or assessment).ti,ab.
7	(psychosocial or biopsychosocial or psycho-social or "psychological distress" or "psychological determinants" or "psychological factors" or "protective factors" or "resilience" or "resiliency" or "hardiness" or "psychological flexibility" or "sociodemographic").ti,ab. or ("Resilience, Psychological" or "Self Efficacy" or "Mental Health" or "Psychosocial Support Systems").sh.
8	5 and 6 and 7
9	English.lg. AND (8 NOT 4)
10	limit 9 to yr="1990-Current"

Database: Embase
Interface: Elsevier (https://embase.com)
Date Searched: Jan. 4, 2019

LINE	SEARCH QUERY
1	((psychosocial NEAR/3 factor*):ti,ab) OR ((protective NEAR/3 factor*):ti,ab) OR 'psychosocial environment'/exp OR 'resilience'/exp OR 'biopsychosocial':ti,ab OR 'psycho-social':ti,ab OR 'psychological determinants':ti,ab OR resilience:ti,ab OR resiliency:ti,ab OR hardiness:ti,ab OR 'sociodemographic':ti,ab OR 'psychological flexibility':ti,ab
2	battle injury'/exp OR 'blunt trauma'/exp OR 'crush trauma'/exp OR 'head and neck injury'/exp OR 'limb injury'/exp OR 'multiple trauma'/exp OR 'musculoskeletal injury'/exp OR 'pelvis injury'/exp OR 'traumatic amputation'/exp OR 'traumatic shock'/exp OR ((physical NEAR/3 trauma):ti,ab) OR ((traumatic NEAR/3 injur*):ti,ab) OR polytrauma:ti,ab OR 'multiple trauma':ti,ab
3	cadaver'/de OR 'in vitro study'/exp OR 'abstract report'/de OR 'book'/de OR 'editorial'/de OR 'note'/de OR 'letter'/it OR 'case study'/de OR 'case report'/de OR 'conference abstract'/it OR 'chapter'/it OR 'conference paper'/it OR 'conference review'/it
4	('juvenile'/exp OR 'fetus'/exp OR 'embryo'/exp) NOT 'adult'/exp
5	(#1 AND #2) NOT (#3 OR #4)
6	#5 AND [english]/lim AND [1990-2019]/py

Database: Cochrane Central Register of Controlled Trials (CENTRAL)
Interface: Wiley (https://www.cochranelibrary.com/central)
Date Searched: Jan. 7, 2019

LINE	SEARCH QUERY
1	(trauma or traumatic or polytrauma):ti,ab,kw AND (psychosocial or biopsychosocial or psycho-social or "psychological determinants" or "protective factors" or "resilience" or "resiliency" or "hardiness"):ti,ab,kw
2	(screening or assessment):ti,ab,kw
3	#1 and #2

Database: PsycINFO
Interface: APA (http://psycnet.apa.org)
Date Searched: Jan. 7, 2019

LINE	SEARCH QUERY
1	(((IndexTermsFilt: ("Injuries") OR IndexTermsFilt: ("Wounds") OR IndexTermsFilt: ("Spinal Cord Injuries")) OR (abstract: (amputation) OR abstract: (fracture) OR abstract: (fractured) OR abstract: (fractures) OR abstract: (dislocation) OR abstract: (dislocations) OR abstract: (polytrauma) OR abstract: ("physical trauma")) OR (title: (amputation) OR title: (fracture) OR title: (fractured) OR title: (fractures) OR title: (dislocation) OR title: (dislocations) OR title: (polytrauma) OR title: ("physical trauma"))) AND ((Year: [1990 TO 2019] OR TestYear: [1990 TO 2019]) AND PublicationTypeFilt: "Peer Reviewed Journal" AND ((AgeGroupFilt: ("Adulthood (18 yrs & older)")))))) AND (((IndexTermsFilt: ("Risk Factors") OR IndexTermsFilt: ("Protective Factors") OR IndexTermsFilt: ("Psychosocial Factors") OR IndexTermsFilt: ("Resilience (Psychological)")) OR (abstract: (psychosocial) OR abstract: (biopsychosocial) OR abstract: (psyco-social) OR abstract: ("psychological determinants") OR abstract: ("protective factors") OR abstract: ("resilience") OR abstract: ("hardiness") OR abstract: ("resiliency")) OR (title: (psychosocial) OR title: (biopsychosocial) OR title: (psyco-social) OR title: ("psychological determinants") OR title: ("protective factors") OR title: ("resilience") OR title: ("hardiness") OR title: ("resiliency"))) AND ((Year: [1990 TO 2019] OR TestYear: [1990 TO 2019]) AND PublicationTypeFilt: "Peer Reviewed Journal" AND ((AgeGroupFilt: ("Adulthood (18 yrs & older)")))))

Appendix VI – Inclusion Criteria

Standard Inclusion Criteria

- Article must be a full article report of a clinical study (studies using registry data can be included in a guideline if it is published in a peer-reviewed journal and meets all other inclusion criteria/quality standards).
- **Non-comparative case series/incidence/prevalence studies**, meeting abstracts, historical articles, editorials, letters, and commentaries are ***excluded***.
- Controlled trials in which patients were not stochastically assigned to groups AND in which there was either a difference in patient characteristics or outcomes at baseline AND where the authors did not statistically adjust for these differences when analyzing the results are ***excluded***.
- All studies of **"Very Low" quality** of evidence (e.g. Level V) are ***excluded***.
- Study must appear in a peer-reviewed publication
- Study must be of humans
- Study must be published in English
- Study results must be quantitatively presented
- Study must not be an in vitro study
- Study must not be a biomechanical study
- Study must not have been performed on cadavers

Customized Inclusion Criteria

- Study must be of a **physical trauma injury**
- Study must be published in or after **1990**
- Study should have **30 or more patients** per group
- Study should have **10 or more respondents** per group
- Patient follow-up times should be between **six months (from point of assessment)** and **max**

We will only evaluate surrogate outcomes when no patient-oriented outcomes are available.

Best Available Evidence

When examining primary studies, we will analyze the best available evidence regardless of study design. We will first consider randomized controlled trials identified by the search strategy. In the absence of two or more RCTs, we will sequentially search for prospective controlled trials, prospective comparative studies, retrospective comparative studies, and prospective case-series studies. Only studies of the highest level of available evidence are included, assuming that there were 2 or more studies of that higher level. For example, if there are two high quality studies that address the recommendation, moderate and low studies addressing the same procedure and outcomes are not included.

Appendix VII – Letters of Endorsement from External Organizations

View background material via the PRF CPG eAppendix

From: Julie L. Higham <jhigham@sccm.org>
Sent: Friday, February 14, 2020 5:19 PM
To: Krause, Barbara
Subject: AAOS Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Kaitlyn S. Sevarino, MBA, CAE
Senior Manager,
Department of Clinical Quality and Value

Dear Ms. Sevarino,

The Society of Critical Care Medicine has voted to endorse the AAOS Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this clinical practice guideline and reprint our logo in the introductory section of the clinical practice guideline review document.

Sincerely,

Julie L. Higham, BA | Guidelines Manager | Society of Critical Care Medicine
Ph: +1-847-827-7937 | Fax: +1-847-439-7226 | 500 Midway Drive, Mount Prospect, IL 60056-5811 USA
www.sccm.org | www.facebook.com/SCCM1 | www.twitter.com/SCCM | www.youtube.com/SCCM500

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American Academy of Physical Medicine and Rehabilitation

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February 14, 2020

Kaitlyn S. Sevarino, MBA, CAE
Senior Manager
Department of Clinical Quality and Value

RE: AAOS Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma

Dear Ms. Sevarino,

Thank you for allowing the American Academy of Physical Medicine and Rehabilitation (AAPM&R) the opportunity to review the American Academy of Orthopaedic Surgeons (AAOS) Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma. AAPM&R is the national medical specialty organization representing more than 9,000 physicians who are specialists in physical medicine and rehabilitation (PM&R). PM&R physicians, also known as physiatrists, treat a wide variety of medical conditions affecting the brain, spinal cord, nerves, bones, joints, ligaments, muscles, and tendons. PM&R physicians evaluate and treat injuries, illnesses, and disability, and are experts in designing comprehensive, patient-centered treatment plans. Physiatrists utilize cutting-edge as well as time-tested treatments to maximize function and quality of life.

We are pleased to inform you that the AAPM&R Clinical Practice Guideline (CPG) Committee has voted to endorse the AAOS Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this clinical practice guideline and reprint our logo in the introductory section of the clinical practice guideline review document. AAPM&R would also like your permission to post the most updated version of the guideline on our website or, if you prefer, to provide a link to the guideline on your website.

Thank you, again, for the opportunity to review and endorse the AAOS Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma. If you have any additional questions or concerns, please contact Brit Galvin, Health Policy and State Legislative Affairs Manager, Department of Health Policy and Practice Services, at bgalvin@aapmr.org or (847) 737-6004.

Sincerely,

Armando Miciano MD, FAAPMR
Clinical Practice Guidelines Committee, Chair
American Academy of Physical Medicine and Rehabilitation

Physicians Adding Quality to Life®

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—TRAUMA—
ASSOCIATION

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Kathleen Caswell, CAE
Executive Director

February 13, 2020

Kaitlyn S. Sevarino, MBA, CAE
Senior Manager,
Department of Clinical Quality and Value

Dear Ms. Sevarino,

The OTA has voted to endorse the AAOS Clinical Practice Guideline for Evaluation of Psychosocial Factors Influencing Recovery from Orthopaedic Trauma. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this clinical practice guideline and reprint our logo in the introductory section of the clinical practice guideline review document.

Sincerely,

Kathleen Caswell

Kathleen Caswell
OTA Executive Director

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