

Management of Distal Radius Fractures

Evidence-Based Clinical Practice Guideline

Adopted by:

The American Academy of Orthopaedic Surgeons Board of Directors
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Adopted by:

The American Society for Surgery of the Hand Council
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Endorsed by:



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Disclaimer

This Clinical Practice Guideline was developed as a joint project with American Academy of Orthopaedic Surgeons (AAOS) and American Society for Surgery of the Hand (ASSH) physician volunteer Clinical Practice Guideline development group based on a systematic review of the current scientific and clinical information and accepted approaches to management of distal radius fractures. 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 clinical circumstances.

Disclosure Requirement

In accordance with AAOS policy, all individuals whose names appear as authors or contributors to the 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

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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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SUMMARY OF RECOMMENDATIONS

ARTHROSCOPIC ASSISTANCE

Inconsistent evidence suggests no difference in outcomes between use of arthroscopic assistance and no arthroscopic assistance when treating patients for distal radius fractures.

Strength of Recommendation: Moderate ★★★★★

Description: 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.

HOME EXERCISE PROGRAM

Inconsistent evidence suggests no difference in outcomes between a home exercise program and supervised therapy following treatment for distal radius fractures.

Strength of Recommendation: Limited ★★★★★

Description: Evidence from two or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

INDICATIONS FOR FIXATION (NON-GERIATRIC PATIENTS)

Moderate evidence supports that for non-geriatric patients (most commonly defined in studies as under 65 years of age), operative treatment for fractures with post reduction radial shortening >3mm, dorsal tilt >10 degrees, or intraarticular displacement or step off >2 mm leads to improved radiographic and patient reported outcomes.

Strength of Recommendation: Moderate ★★★★★

Description: 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.

INDICATIONS FOR FIXATION (GERIATRIC PATIENTS)

Strong evidence suggests that operative treatment for geriatric patients (most commonly defined in studies as 65 years of age and older) does not lead to improved long term patient reported outcomes compared to non-operative treatment.

Strength of Recommendation: Strong ★★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

SERIAL RADIOGRAPHY

Limited evidence suggests no difference in outcomes based on frequency of radiographic evaluation for patients treated for distal radius fractures.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from two or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

FIXATION TECHNIQUE

Strong evidence suggests no significant difference in radiographic or patient reported outcomes between fixation techniques for complete articular or unstable distal radius fractures, although volar locking plates lead to earlier recovery of function in the short term (3 months).

Strength of Recommendation: Strong ★★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

SUMMARY OF CONSENSUS STATEMENT

There is no evidence or only conflicting supporting evidence for the following recommendations. In the absence of reliable evidence, the systematic literature review development group is making a recommendation based on their clinical opinion.

OPIOID USE

In the absence of sufficient evidence specific to distal radius fractures, it is the opinion of the workgroup that opioid sparing and multimodal pain management strategies should be considered for patients undergoing treatment for distal radius fractures.

Strength of Recommendation: Consensus 

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INTRODUCTION

OVERVIEW

This clinical practice guideline is based on a systematic review of published studies on the treatment of distal radius fractures in adults (>18 years). The scope of the guideline is limited to the treatment of acute distal radius fractures and does not address distal radius malunion. In addition to providing pragmatic practice recommendations, this guideline also highlights gaps in the literature and informs areas for future research and quality measure development.

The clinical practice guideline is intended for any appropriately trained/qualified physicians managing the treatment of distal radius fractures. It is also intended to serve as a resource for professional healthcare practitioners, professional organizations, and developers of practice guidelines and quality measures.

GOALS AND RATIONALE

The purpose of this clinical practice guideline is to inform treatment of acute distal radius fractures based on the current best evidence. To assist in the implementation of best available evidence into practice, this clinical practice guideline consists of a systematic review of the available literature and guidance regarding the treatment of distal radius fractures. The systematic review detailed herein was conducted between February 2019 and February 2020 and identifies where there is high quality evidence, where evidence is lacking or conflicting, and what topics future research must target in order to improve the treatment of patients with acute distal radius fractures. AAOS staff and the physician work group systematically reviewed the available literature and subsequently wrote the following recommendations based on a rigorous, standardized process.

Musculoskeletal care is provided in many different settings by many different providers. We created this guideline as an educational tool to guide qualified physicians through a series of management decisions in an effort to improve the quality and value of care. This guideline is not to be construed as including all proper methods of care or excluding methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific procedure or treatment includes consideration of patient specific factors and the needs and resources particular to the context of care.

INTENDED USERS

This guideline is intended to be used by orthopaedic surgeons and all qualified physicians managing patients with acute distal radius fractures. Typically, orthopaedic surgeons will have completed medical training, including a qualified residency in orthopaedic surgery, and some may have completed additional sub-specialty training. It is also intended to serve as an information resource for professional healthcare practitioners and developers of practice guidelines and recommendations.

Treatment for acute fracture of the distal radius is based on a shared decision-making process that includes discussion of available treatments, their evidentiary support, and the values and preferences of patients (Hand Surgery Quality Consortium, 2020).

PATIENT POPULATION

This document addresses the treatment of acute distal radius fracture in adults (defined as patients 18 years of age and older).

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BURDEN OF DISEASE

As one of the most common fractures in adults, distal radius fractures result in significant financial burden. For example, distal radius fractures account for almost 20% of fractures seen by physicians and is the second most common fracture experienced by older adults (Levin LS, 2017). In 2005 alone, the treatment for distal radius fractures in the elderly was estimated at \$500 million. By 2025 this burden is expected to increase by 20% (Burge R, 2007).

ETIOLOGY

Distal radius fractures occur as a result of both high energy and low energy trauma. There is a bimodal distribution of distal radius fractures where high-energy fractures occur in younger persons (predominately male) and high and low-energy fractures occur in older persons (predominately female) (Chen NC, 2007) (Court-Brown CM, 2006).

INCIDENCE

Distal radius fracture is one of the most common fractures seen by orthopaedic surgeons with an incidence of 195.2/100,000 persons per year (Court-Brown CM, 2006).

RISK FACTORS

Age (e.g. older women with osteoporosis) and sex (e.g. young males) are known risk factors for distal radius fracture in adults. Lifestyle can also have an influence on risk for distal radius fracture as playing/sporting activities and motor vehicle accidents are associated with distal radius fractures (MacIntyre N, 2016).

EMOTIONAL AND PHYSICAL IMPACT

Acute distal radius fracture results in pain, limitations in function, stress, and the potential inability to work. Patients may be faced with substantial morbidity and stress/distress (e.g. financial distress) if fracture healing is delayed, there is permanent loss in function, or there is ongoing pain. Additionally, the time to return to normal function after appropriate treatment can be prolonged, and in some cases, never return to normal (MacDermid JC, 2003).

POTENTIAL BENEFITS, HARMS, AND CONTRAINDICATIONS

The aim of treatment is pain relief and return of function while weighing the risks and benefits of nonoperative and operative treatment. Therefore, an open shared decision-making process should be undertaken that includes available treatments and their respective risks and benefits, in the setting of the values and preferences of the individual patient (patient centered care) (Shapiro LM, 2019).

FUTURE RESEARCH

The adoption of technology and novel treatments for distal radius fractures requires evidentiary support of efficacy and effectiveness while acknowledging cost and value. Likewise, current practice patterns, despite being practice norms, may not be supported as high-quality care, and should be evaluated by the same level of scrutiny. The systematic review for this guideline identified areas of care with conflicting evidence, and some areas of care where more focused clinical trials are needed. For example, our evaluation of the evidence for hand therapy after the treatment of distal radius fractures identified areas for potential future research, such as the benefit of supervised therapy for elderly patients with finger arthritis and preoperative stiffness.

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View data summaries via the DRF CPG [eAppendix 2](#)

Additional References:

1. Burge, R., Dawson-Hughes, B., Solomon, DH., Wong, JB., King, A., Tosteson, A. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. *J Bone Miner Res.* 2007;22(3):465-475.
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7. MacIntyre, NJ., Dewan, N. Epidemiology of distal radius fractures and factors predicting risk and prognosis. *J Hand Ther.* 2016;29(2):136-45.
8. Shapiro, LM., Eppler, SL., Baker, LC., Harris, AS., Gardner, MJ., Kamal, RN. The usability and feasibility of conjoint analysis to elicit preferences for distal radius fractures in patients 55 years or older. *J Hand Surg Am.* 2019;44(10):846-852.

METHODS

The methods used to perform this clinical practice guideline 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 for management of Distal Radius Fractures. To view the full AAOS clinical practice guideline methodology please visit the [eAppendix 1](#) or <https://www.aaos.org/additonalresources/>.

This clinical practice guideline evaluates the effectiveness of approaches in the management of Distal Radius Fractures. 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.

Patient preferences and needs are recognized as a significant element in the clinical practice guideline development process. Prior to commencing the solicitation of guideline work groups, AAOS seeks IRB-exemption by obtaining the views of the targeted population via an online survey. This survey, developed to specifically address the condition of interest, is voluntary, and does not capture any personal information of the submitter. Survey questions seek information on the kind of treatment the patient received as well as their opinion on various aspects of care they were provided. Before releasing the survey to patients, AAOS seeks approval from the WIRB, which is accredited by the Association for the Accreditation of Human Research Protection Programs. Once approved as exempt, the specified survey is distributed to the public via CUE (Consumer United for Evidence-Based Medicine) and through AAOS' social media platforms. Survey results are collected, and comments are compiled and presented to the guideline work group members for review. While the work group has final determination regarding the PICO questions included in the guideline, these results are offered as an opportunity for the work group to consider patient perspectives and preferences when deciding how to structure the guideline topics.

This clinical practice guideline was prepared by the AAOS Management of Distal Radius Fractures Clinical Practice Guideline Physician Development Group (clinical experts) with the assistance of the AAOS Clinical Quality and Value (CQV) Department (methodologists). To develop this systematic literature review, the systematic literature review development group held an introductory meeting on February 11, 2019 to establish the scope of the systematic literature review. As the physician experts, the systematic literature review 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 [eAppendix 1](#) for search strategy).

BEST EVIDENCE SYNTHESIS

We included only the best available evidence for any given outcome addressing a recommendation. Accordingly, we first included the highest quality evidence for any given outcome if it was available. In the absence of two or more occurrences of an outcome at this quality, we considered outcomes of the next lowest quality until at least two or more occurrences of an outcome had been acquired. For example, if there were two 'moderate' quality occurrences of an outcome that addressed a recommendation, we did not include 'low' quality occurrences of this outcome. A summary of excluded articles can be viewed in [eAppendix 1](#). All of the detailed data for each recommendation can be found via [eAppendix 2](#).

LITERATURE SEARCHES

The medical librarian conducted a comprehensive search of PubMed, Embase, and the Cochrane Central Register of Controlled Trials based on key terms and concepts from the systematic literature review

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development group’s preliminary recommendations. Bibliographies of relevant systematic reviews were hand searched for additional references. All databases were last searched on February 19, 2020 with limits for publication dates from 2000-the date of the last search and English language.

DEFINING THE STRENGTH OF THE RECOMMENDATIONS

Judging the strength of evidence is only a steppingstone towards arriving at the strength of a systematic literature review recommendation. The strength of recommendation (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, 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; Please see appendix for voting breakdown.

INTERPRETING THE STRENGTH OF EVIDENCE

Table 1. 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.	

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Table II. Clinical Applicability: 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

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), 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.

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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, 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 CLINICAL PRACTICE GUIDELINE APPROVAL PROCESS

This final clinical practice guideline draft must be approved by the AAOS Committee on Evidence-Based Quality and Value Committee, the AAOS Council on Research and Quality, and the AAOS Board of Directors. These decision-making bodies are described in [eAppendix 1](#). 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, re-issued, or withdrawn in five years.

SYSTEMATIC LITERATURE REVIEW 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 systematic literature reviews is announced by an Academy press release, articles authored by the systematic literature review development group and published in the *Journal of the American Academy of Orthopaedic Surgeons*, and articles published in *AAOS Now*.

Selected clinical practice guidelines are disseminated by webinar, AAOS Online Learning, the Orthopaedic Video Theater (OVT), Media Briefings, and by distributing them at relevant Continuing Medical Education (CME) courses and at the AAOS Resource Center.

STUDY ATTRITION FLOWCHART



RECOMMENDATIONS

ARTHROSCOPIC ASSISTANCE

Inconsistent evidence suggests no difference in outcomes between use of arthroscopic assistance and no arthroscopic assistance when treating patients for distal radius fractures.

Strength of Recommendation: Moderate ★★☆☆

Description: 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.

RATIONALE:

There was 1 high (Yamazaki, H 2015), and 2 moderate strength (Varitimidis, SE 2008 and Selles, CA) studies evaluating the use of wrist arthroscopy as an adjunctive treatment for distal radius fracture fixation. Although many comparative studies have been done, the variability of study design, surgical indications, fracture classification systems and implants used makes interpretation of the literature challenging. Evaluation of these studies, however, does not show apparent treatment benefit for the use of wrist arthroscopy at the time of distal radius fracture fixation.

One high strength study (Yamazaki, H 2015) that specifically evaluated arthroscopic-aided reduction and fluoroscopy with fluoroscopy alone at the time of distal radius fracture fixation with volar locking plate technology did not show a significant difference in patient functional outcomes at 48 months. This finding is corroborated by a moderate quality study (Selles, CA 2019) that also compared the intraoperative use of wrist arthroscopy to remove fracture hematoma and debris with a similar cohort treated by open reduction and internal fixation. Here also, a significant difference in outcome could not be determined at 12 months. One moderate strength study (Varitimidis, SE 2008) did conclude that some parameters of radiographic outcome could be improved using a combination of distal radius fracture fixation, arthroscopic evaluation, and fragment-specific pinning and that these patients had improved clinical outcomes.

Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing this recommendation as it supports not using wrist arthroscopy during fixation of distal radius fracture.

Future Research

Continued high quality comparative studies that assess contemporary fracture care for specific fracture patterns and the adjunctive use of arthroscopy to improve fracture reduction, treatment of associated soft tissue injury, and implant position may further clarify the role (if any) of wrist arthroscopy in the treatment of specific patterns of distal radius fracture that requires operative treatment.

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Additional References:

1. Selles CA, Reerds STH, Roukema G, van der Vlies KH, Cleffken BI, Schep NWL. Relationship between plate removal and Soong grading following surgery for fractured distal radius. *J Hand Surg Eur Vol.* 2018;43(2):137-141. doi:10.1177/1753193417726636
2. Varitimidis, S. E., Basdekis, G. K., Dailiana, Z. H., Hantes, M. E., Bargiotas, K., Malizos, K. Treatment of intra-articular fractures of the distal radius: fluoroscopic or arthroscopic reduction? *Journal of Bone & Joint Surgery - British Volume* 2008; 6: 778-85
3. Yamazaki, H., Uchiyama, S., Komatsu, M., Hashimoto, S., Kobayashi, Y., Sakurai, T., Kato, H. Arthroscopic assistance does not improve the functional or radiographic outcome of unstable intra-articular distal radial fractures treated with a volar locking plate: a randomised controlled trial. *Bone & Joint Journal* 2015; 7: 957-62

HOME EXERCISE PROGRAM

Inconsistent evidence suggests no difference in outcomes between a home exercise program and supervised therapy following treatment for distal radius fractures.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from two or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

RATIONALE:

Current evidence is insufficient to answer the question of whether supervised hand therapy leads to different outcomes as compared to an independent home exercise program following surgical or non-surgical treatment of a distal radius fracture (DRF). There were only a few studies that met the inclusion criteria and even those had some important shortcomings. After expanding the number of studies, issues with the experiments included risk of bias, lack of homogeneity regarding injury severity, variable ages, and low prevalence of post-fracture complications. One high (Gutierrez Espinoza et al, 2017) and six moderate quality studies (Valdes et al, 2015; Souer et al, 2011; Oken et al. 2011; Krischak et al, 2009; Maciel et al. 2005; Wakefield et al, 2000) were included and appraised. One found a benefit to supervised therapy 3 weeks after injury or surgery (Oken et al. 2011), and one (Gutierrez Espinoza et al, 2017) at 6 weeks and at 6 months. In contrast, one study (Krischak et al, 2009) favored independent exercises at 6 weeks, and 4 found no difference between supervised and independent exercises (Valdes et al, 2015; Souer et al, 2011; Maciel et al. 2005; Wakefield et al, 2000).

Risks and Benefits of Implementation

It is possible that a subset of people recovering from distal radius fractures might benefit from supervised hand therapy, and experience more rapid return to function with decreased total societal costs. For those that independent exercises are sufficient, we can preserve health care resources and minimize cost and time burden for patients recovering from distal radius fractures through independent exercises.

Outcome Importance

A rule prohibiting supervised therapy after distal radius fractures might limit access for a subset of people who stand to benefit. We might conclude that—to date—routine supervised hand therapy does not seem to provide a benefit on average.

Cost Effectiveness/Resource Utilization

We currently lack sufficient evidence to determine if there are circumstances in which supervised therapy limits patient and societal costs.

Acceptability

There is a risk that surgeons might feel this statement restricts their ability to ask for help from expert colleagues when a patient’s recovery from distal radius fractures is delayed or difficult. There is a risk

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that hand therapists will feel the summary of the evidence undervalues their contributions to the recovery of some people recovering from distal radius fractures.

Feasibility

Implementation of this summary is feasible to the extent that it does not become an all or none policy and that we continue to investigate factors that facilitate recovery and utilize supervised hand therapy for those subset(s) of patients where clinical benefit can be demonstrated.

Future Research

More and better evidence is needed to determine when supervised hand therapy benefits people recovering from DRF. Most importantly, further research is needed to determine prognostic criteria that would allow for proper patient selection. Thus, research should be invested in establishing a classification system for DRF patients sub-categorization based on their rehabilitation needs, while considering all contextual factors that may limit their recovery potential.

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INDICATIONS FOR FIXATION (NON-GERIATRIC PATIENTS)

Moderate evidence supports that for non-geriatric patients (most commonly defined in studies as under 65 years of age), operative treatment for fractures with post reduction radial shortening >3mm, dorsal tilt >10 degrees, or intraarticular displacement or step off >2 mm leads to improved radiographic and patient reported outcomes.

Strength of Recommendation: Moderate ★★☆☆

Description: 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.

RATIONALE:

This guideline is based on 1 high quality study, and 26 moderate quality studies using radiographic parameters of radial shortening >3mm, dorsal tilt >10, or intra-articular displacement or step-off >2mm in adult patients less than 65 years of age diagnosed with a distal radius fracture. The term non-geriatric was used as the spirit of this guideline is to address distal radius fractures in those patients with high functional demand. Age is commonly used as a proxy for functional demand, often using less than 65 years of age to describe those with high functional demand. Although outcomes vary, overall, these studies consistently demonstrated that operative treatment led to improved radiographic outcomes and/or patient reported outcomes in those less than 65 years of age.

Risks and Benefits of Implementation

The results from this CPG align with those of the AAOS Clinical Practice Guideline from 2009, suggesting current practice based on the aforementioned radiographic parameters leads to improved patient outcomes. As such, we anticipate no risks with implementing this guideline.

Future Research

The effects of using more rigid radiographic criteria (e.g. any fracture displacement not just >2mm) as indications for surgical fixation, and their effect on patient outcomes have not been well studied. The durability of these treatment indications on patient outcomes in the longer term (e.g. 10-20 years) should also be studied.

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INDICATIONS FOR FIXATION (GERIATRIC PATIENTS)

Strong evidence suggests that operative treatment for geriatric patients (most commonly defined in studies as 65 years of age and older) does not lead to improved long-term patient reported outcomes compared to non-operative treatment.

Strength of Recommendation: Strong ★★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

RATIONALE:

This guideline is based on 2 high quality studies, and 11 moderate quality studies comparing operative and nonoperative treatment in those >65 years of age. Some studies demonstrated improvements in patient reported outcomes in the short term (usually less than 3 mo.). Studies consistently showed no difference in patient reported outcomes in the long-term (1 year or greater) despite improvements in radiographic parameters as this is currently the most common metric (parameter or variable) cited in the relevant literature. The term geriatric was used as the spirit of this guideline is to address distal radius fractures in those patients with low functional demand. Age is commonly used as a proxy for functional demand when studying this population, often described as 65 and greater in age.

Risks and Benefits of Implementation

The workgroup acknowledges that age, as used in the cited evidence as well as this clinical practice guideline, is used as a proxy for functional demand. As such, a high functioning patient with high functional demands, despite having an age greater than 65, may benefit from operative fixation based on the literature supporting fixation in young, active patients. At the same time, there may be low functioning younger patients with low functional demands, that despite having an age less than 65, that may benefit from non-operative treatment. A patient-centered discussion understanding an individual patient’s values and preferences can inform appropriate decision making to ensure his/her age and functional demands align to appropriately apply this clinical practice guideline. The recommendations regarding operative treatment are principally based upon literature studying distal radius fracture as an isolated injury. Mitigating circumstances may also be factors in the shared decision-making process.

Future Research

Research using other tools that better describe a patient’s functional demand instead of age are needed. These tools could better inform point of care decisions for the treatment of distal radius fractures in the elderly that avoid the aforementioned risks of treatment based on age alone. While the workgroup acknowledges that functional demand would be a better explanatory variable for understanding the benefits of operative treatment, this clinical practice guideline uses age greater than 65 as this is what is used in the literature.

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SERIAL RADIOGRAPHY

Limited evidence suggests no difference in outcomes based on frequency of radiographic evaluation for patients treated for distal radius fractures.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from two or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

RATIONALE:

No high-quality studies were identified to address this question. One moderate quality study (van Gerven, P., 2019) was identified. This multicenter, prospective, randomized, controlled trial was specifically designed to evaluate the impact of eliminating routine radiographs after the two-week follow up for distal radius fracture. Control group patients received x-rays of the wrist at 1,2,6, and 12 weeks post injury. The experimental group received x-rays of the wrist at 1 and 2 weeks. Thereafter they received wrist x-rays only if they experienced a new trauma, a spike in their pain, or a worsening of their neuro-vascular condition. Patients were followed for 52 weeks. At no time during the 52-week study were there statistically significant differences between the two groups in patient reported measures, (DASH, PRWHE), quality of life, (EQ5), or pain, (VAS). At 52 weeks there were minimally statistically significant differences in range of motion favoring the more frequent x-ray group. Total flexion/extension arc was 10 degrees better, (123 vs 113), and pronation/supination was also better, (175 degrees vs 155 degrees). These differences appear not to impact patient reported outcomes. There was no difference in the complication rate. Patients in the control group received four sets of wrist radiographs. Patients in the experimental group received an average of three.

Risks and Benefits of Implementation

This recommendation is based on a PICO question which was specifically focused on acute management. The benefits of implementing this strategy of eliminating routine radiographs of distal radius fractures after the two-week follow up include reduced radiation to the patient and reduced cost to patient, payer, and society. In this study there was no increase in the complication rate. There may be some possible value in obtaining a final radiograph outside of the time frame addressed within this PICO to establish a healed baseline for comparison against future wrist pain.

Future Research

Longer term follow-up, (5 and 10 year) will be useful to determine if non-inferiority of the reduced radiograph group is maintained.

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FIXATION TECHNIQUE

Strong evidence suggests no significant difference in radiographic or patient reported outcomes between fixation techniques for complete articular or unstable distal radius fractures, although volar locking plates lead to earlier recovery of function in the short term (3 months).

Strength of Recommendation: Strong ★★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

RATIONALE:

This guideline is based upon 6 high quality studies, with 3 comparing different fixation techniques for complete intra-articular distal radius fractures (Jakubietz, Yazdanshenas, Hammer) and 3 comparing different fixation techniques for unstable distal radius fractures (Marcheix, Rozental, Goehre). Yazdanshenas compared external fixation to a “pins and plaster” technique, Jakubietz compared volar and dorsal locking plate fixation and Hammer compared volar locking plates to augmented external fixation. Early in the recovery period the 2 studies that compared volar locked plating demonstrated more rapid recovery of function but at longer term follow up, no significant differences were seen in radiographic outcomes or patient reported outcomes. Marcheix, Rozental, and Goehre each compared volar locked plating to closed reduction and percutaneous fixation and included intra-articular and extra-articular fractures. All 3 demonstrated earlier return of function for the volar locked plating group in the recovery period but the 2 studies with results at 12 months or longer, showed no difference in patient reported outcomes at final follow-up.

Risks and Harms of Implementation

There are no known harms associated with implementing this recommendation beyond those attributed to an open surgery and placing a volar plate (e.g. symptomatic hardware or tendon rupture).

Future Research

The current literature suggests that function recovers earlier in patients treated with volar locked plating than with other methods, but outcomes equalize before a year from injury. Further randomized controlled trials should help address multiple questions including long term complication profiles (tendon ruptures, secondary surgery etc.) and the impact of the differences in cost between various treatment approaches. Further, studies that use fracture type (e.g. extraarticular, partial articular, etc.) to group patients may lead to more actionable results that can be applied to real life care.

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CONSENSUS STATEMENT

There is no evidence or only conflicting supporting evidence for the following recommendations. In the absence of reliable evidence, the systematic literature review development group is making a recommendation based on their clinical opinion.

OPIOID USE

In the absence of sufficient evidence specific to distal radius fractures, it is the opinion of the workgroup that opioid sparing and multimodal pain management strategies should be considered for patients undergoing treatment for distal radius fractures.

Strength of Recommendation: Consensus 

RATIONALE:

There have been very few studies directly comparing pain management regimens including opioids and opioid alternatives for the management of postoperative pain following treatment for distal radius fractures. In 2018, Luo et al examined the effectiveness of celecoxib vs. buprenorphine transdermal patch vs. codeine with ibuprofen. In this study, the authors examined pain at rest, daily activities, rehabilitation, and functional outcomes among 315 patients undergoing volar plate fixation for a distal radius fracture. The authors compared patients in the 2 weeks following surgery to 200 mg celecoxib twice per day (n=149), buprenorphine transdermal patch at 5 µg/h (n=89), and 13 mg codeine plus 200 mg ibuprofen twice per day (n=77), and followed outcomes for the 6 weeks following surgery. for pain management. The authors identified that functional outcomes as measured by the PRWE and DASH scores as well as range of motion among patients receiving celecoxib group were significantly lower at one month and three months compared with other groups. Pain at rest was similar across all groups and was mild. However, the authors noted patients receiving celecoxib had poorer pain management compared with the other groups during rehabilitation. The authors conclude that transdermal buprenorphine or codeine/ibuprofen should be considered for pain management during rehabilitation among patients with distal radius fractures undergoing volar plate fixation. However, this study was deemed low quality by the working group given methodologic gaps.

Despite the lack of evidence for the use of opioids or opioid alternatives among patients with a distal radius fracture, there is a growing body of evidence supporting opioid sparing and/or opioid free pain management options for other musculoskeletal conditions. Based on these studies and the risks of opioid analgesics (adverse events, misuse, opioid use disorder, diversion for nonmedical use), it is the recommendation of the committee that opioid alternatives (pharmacologic (local anesthetics, nonsteroidal anti-inflammatory agents, acetaminophen) and nonpharmacologic (ice, elevation, compression, cognitive therapies) should be considered alongside opioid sparing protocols when possible.

Risks of Implementation

Given the lack of evidence regarding effective pain management, failure to control post-injury and postoperative pain is a potential harm if pain is inadequately treated. Conversely, excess opioid

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prescribing is associated with greater opioid use, prolonged use, and the potential for misuse, opioid use disorders, and diversion to unintended users and nonmedical use.

Future Research

Continued comparative studies are needed to compare the effectiveness of opioid analgesics and non-opioid pharmacologic and nonpharmacologic alternatives to determine the need for opioids, the dose and duration of therapy, and effective alternatives for pain management following distal radius fractures.

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GUIDELINE DEVELOPMENT GROUP DISCLOSURES

Prior to the development of this clinical practice guideline, 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.

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AAOS: Board or committee member (\$0) EBQV(Self)

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This individual reported nothing to disclose

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SLACK Incorporated: Publishing royalties, financial or material support (\$7,000) I have published 2 textbooks on physical therapy documentation for SLACK Inc. and I am a consultant for a book series for the physical therapist assistant (Self)

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