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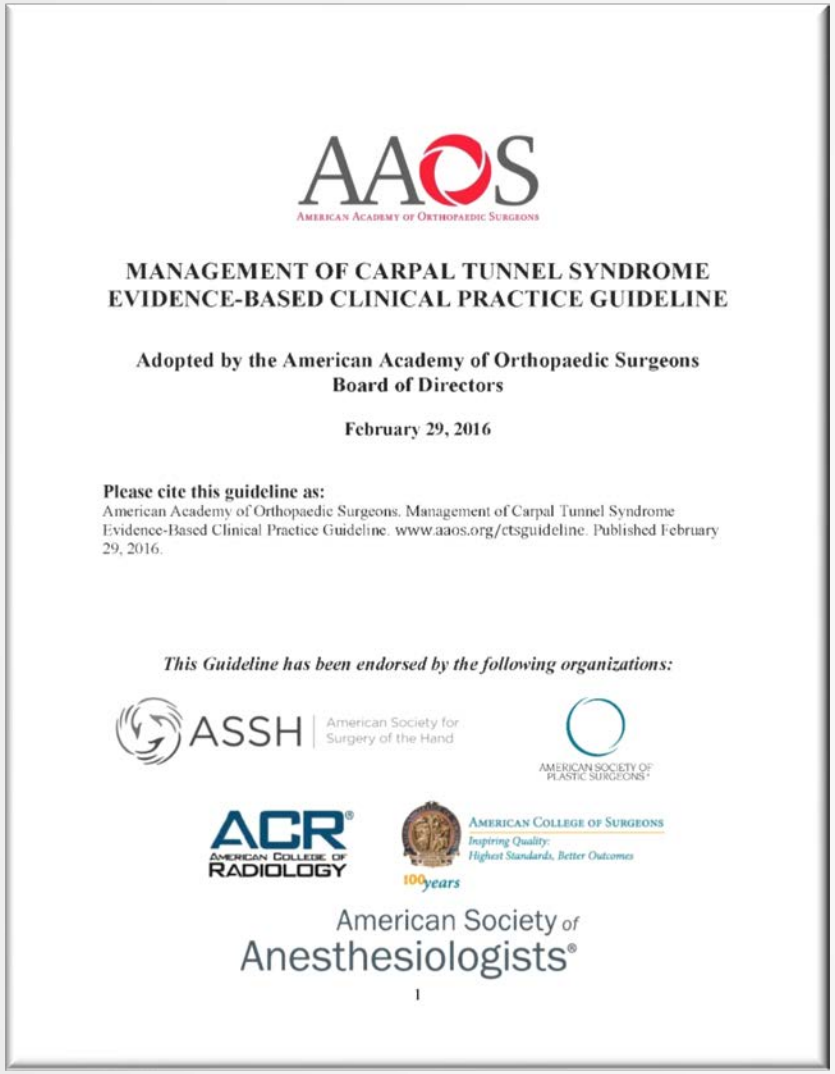
Management of Carpal Tunnel Syndrome: Evidence-Based Clinical Practice Guideline

Adopted by the American Academy of Orthopaedic Surgeons (AAOS) Board of Directors

February 29, 2016



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EVIDENCE-BASED CLINICAL PRACTICE GUIDELINE

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ASSH American Society for Surgery of the Hand
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American College of Surgeons Inspiring Quality: Highest Standards, Better Outcomes 100 years
American Society of Anesthesiologists

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The American Academy of Orthopaedic Surgeons 2016 Clinical Practice Guideline on the Management of Carpal Tunnel Syndrome

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WHAT IS A CLINICAL PRACTICE GUIDELINE?

Clinical Practice Guideline

A clinical practice guideline is a series of recommendations created to inform clinicians of best practices, based on best available evidence

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GOALS AND RATIONALE OF A CLINICAL PRACTICE GUIDELINE

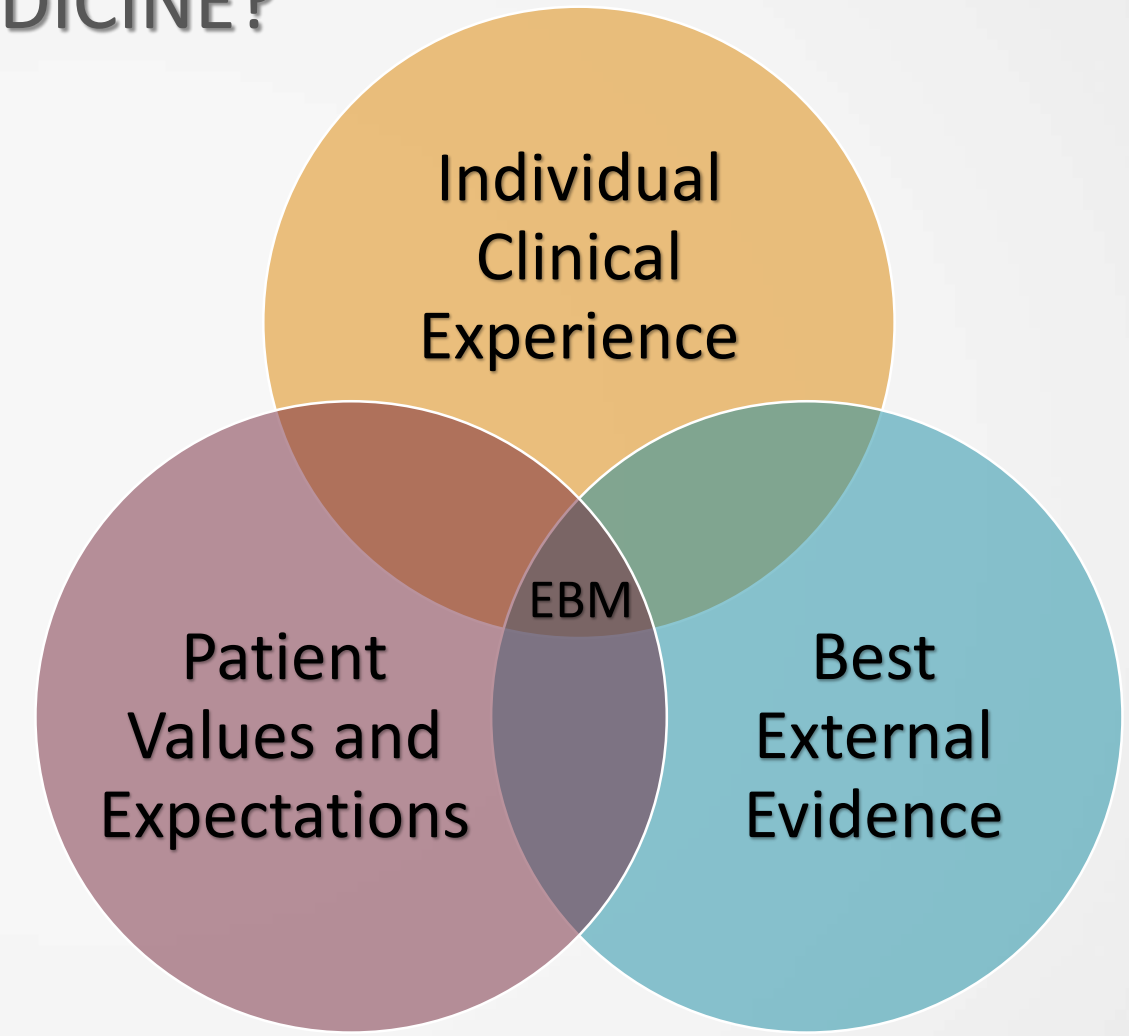
- Improve treatment based on current best evidence
- Guides qualified physicians through treatment decisions to improve quality and efficiency of care
- Identify areas for future research

CPG recommendations are not meant to be fixed protocols; patients' needs, local resources, and clinician independent medical judgement must be considered for any specific procedure or treatment

WHAT IS EVIDENCE-BASED MEDICINE?

Evidence-Based Medicine is a Combination of:

- *Individual Clinical Experience*
- *Best External Evidence*
- *Patient Values and Expectations*



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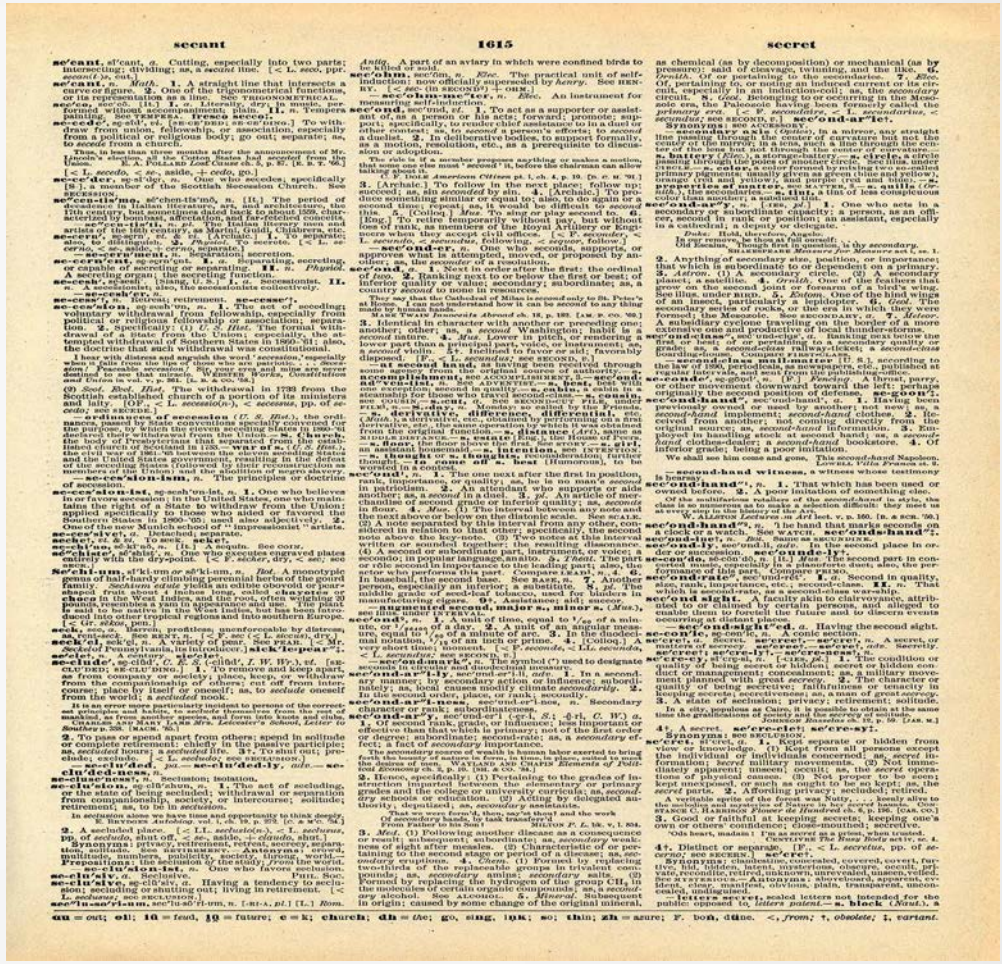
WHAT IS EVIDENCE-BASED MEDICINE?

Evidence-Based Medicine

Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence from clinical care research in the management of individual patients


secant 1615 secret

Haynes, Sackett et al, 1996 Transferring evidence from research into practice
Sacket et al, 1996, BMJ EBM: what it is and isn't

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IOM STANDARDS FOR DEVELOPING TRUSTWORTHY GUIDELINES

- Establish Transparency
- Management of Conflict of Interest
- Guideline Development Group Composition
- Clinical Practice Guideline-Systematic Review Intersection
- Establish Evidence of Foundations for and Rating Strength of Recommendations
- Articulation of Recommendations
- External Review
- Updating

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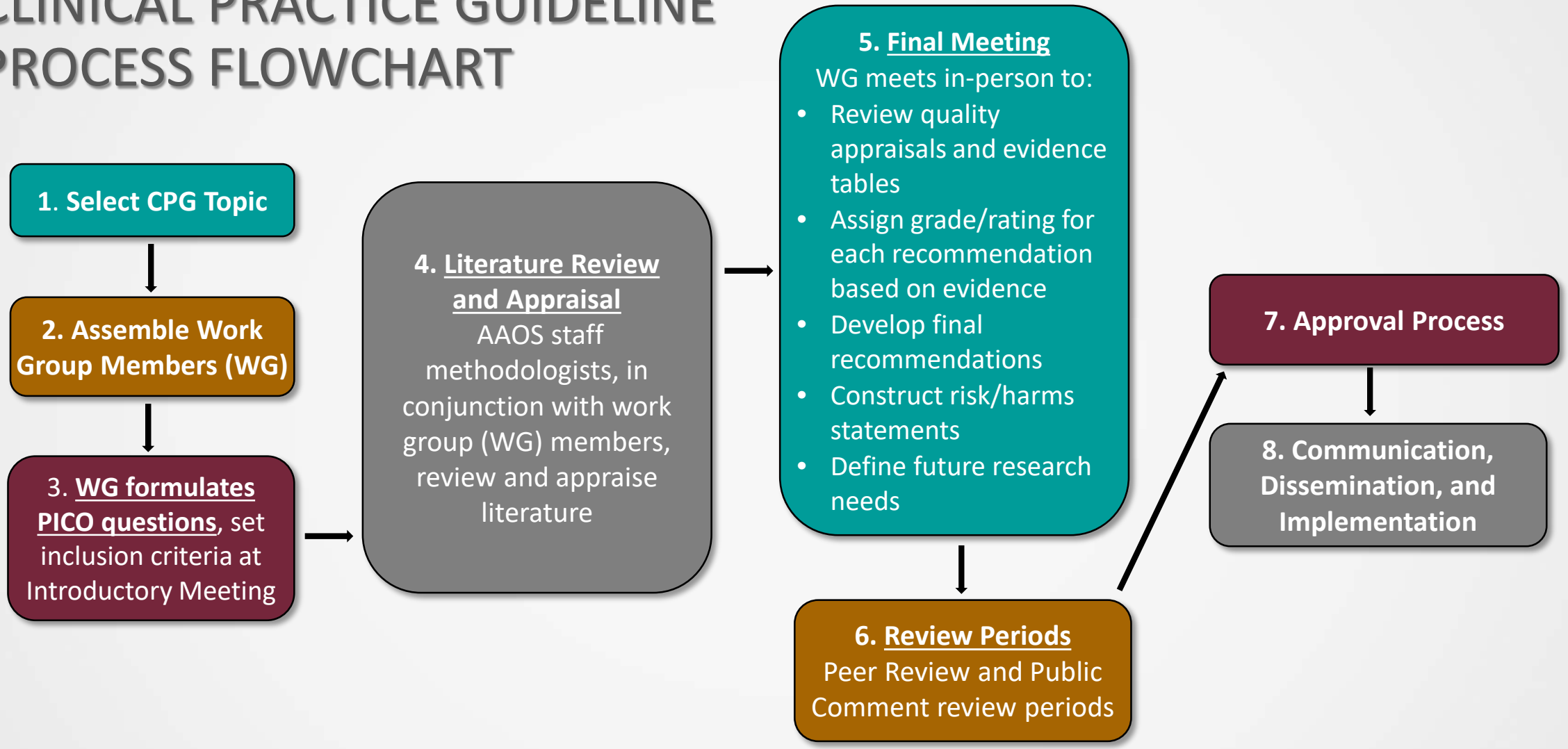
CLINICAL PRACTICE GUIDELINE PROCESS FLOWCHART



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FORMULATING PICOs

"P" = Patient Population

"I" = Intervention or variable of Interest

"C" = Comparison

"O" = Outcome

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INCLUSION/EXCLUSION CRITERIA

Standard inclusion criteria include:

- Must study humans
- Must be published in English
- Must be published in or after 1966
- Can not be performed on cadavers

Work group members define additional exclusion criteria based on PICO question

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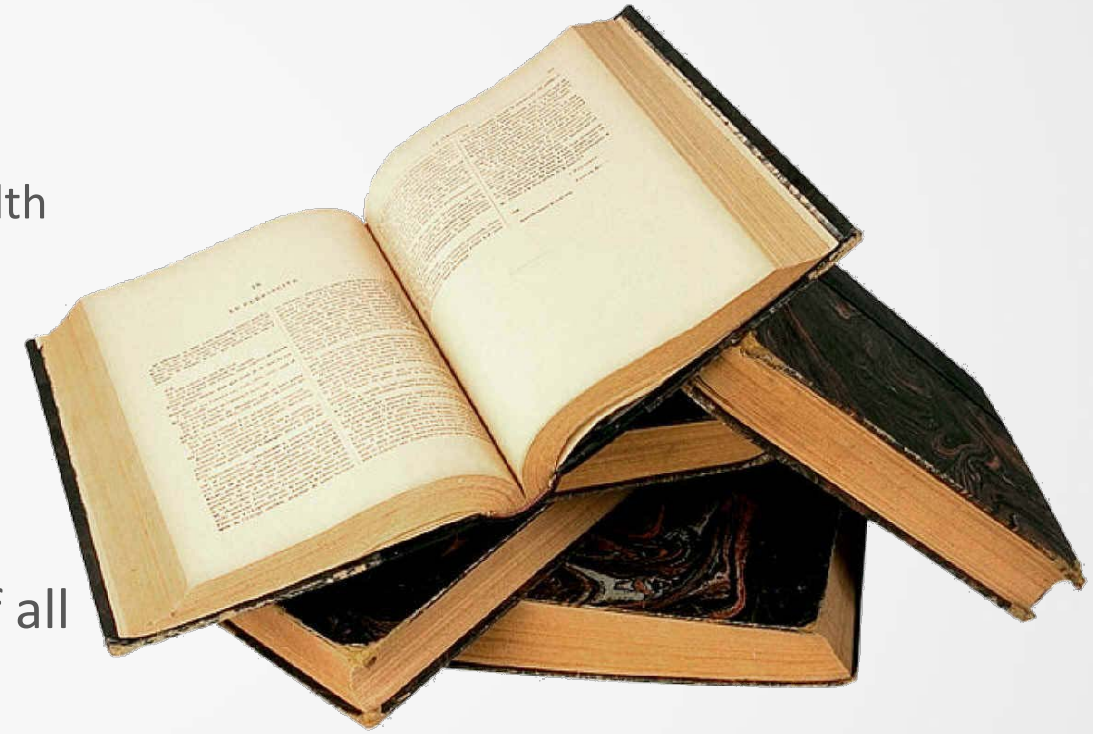
LITERATURE SEARCHES

- Databases used:
  - PubMed
  - EMBASE (Excerpta Medica dataBASE)
  - CINAHL (Cumulative Index of Nursing and Allies Health Literature)
  - Cochrane Central Register of Controlled Trials
- Search using key terms from work group's PICO questions and inclusion criteria
- Secondary manual search of the bibliographies of all retrieved publications for relevant citations
- Recalled articles evaluated for inclusion based on the study selection criteria



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BEST EVIDENCE SYNTHESIS

- Include only highest quality evidence for any given outcome if available
- If there are fewer than two occurrences of an outcome of this quality, the next lowest quality is considered until at least two occurrences have been acquired.

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STRENGTH OF RECOMMENDATIONS

STRENGTH	OVERALL STRENGTH OF EVIDENCE	STRENGTH VISUAL
STRONG	Two or more HIGH Strength Studies with consistent findings	
MODERATE	1 HIGH OR 2 MODERATE strength studies with consistent findings	
LIMITED	One or more LOW strength studies and/or only 1 MODERATE strength study with consistent findings or evidence from a single, or the evidence is insufficient, or conflicting	
CONSENSUS	Expert opinion (no studies) No supporting evidence in the absence of reliable evidence. Work group is making a recommendation based on their clinical opinion	

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TRANSLATING RECOMMENDATIONS IN A CPG

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	More	Possible / Anticipates
Consensus	Most	Most Important	Impact unknown

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ASSESSING QUALITY OF EVIDENCE

All included studies undergo a quality assessment

Each study's design is evaluated for risk of bias and receives a final quality grade, depending on the number of study design flaws

Study quality tables are made available to the work group in the final data report and the final publication of the guideline/systematic review

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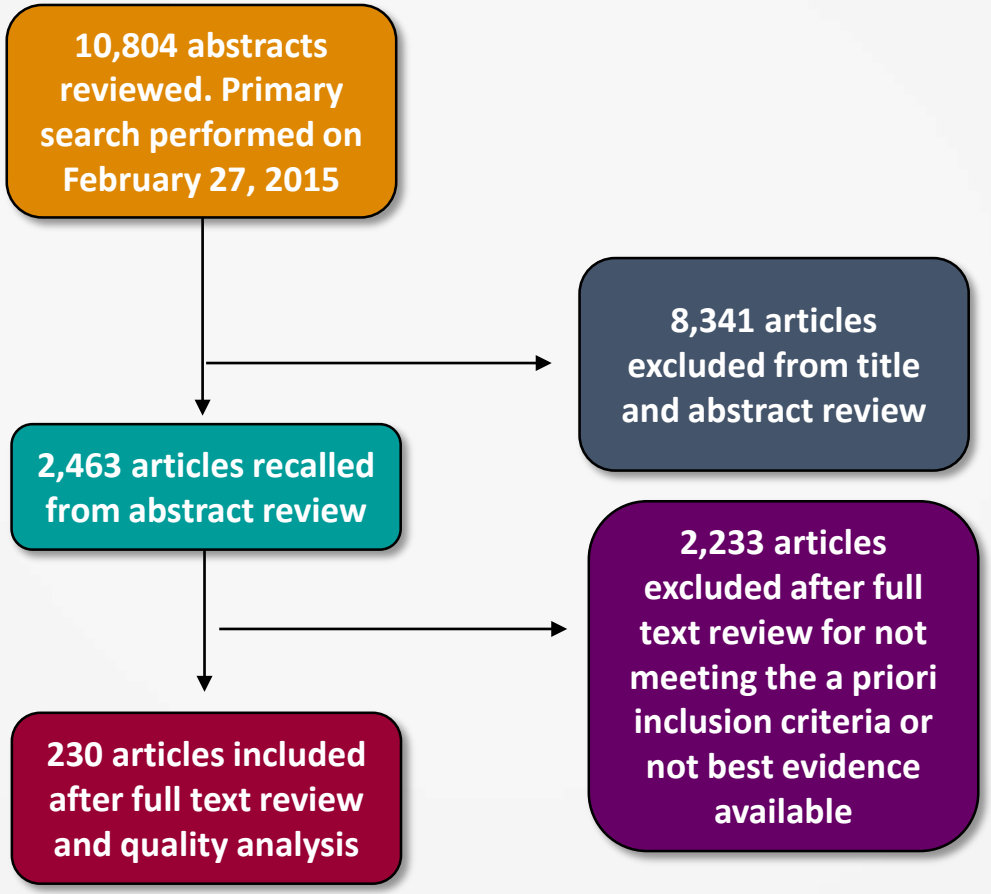
RESULTS OF QUALITY ASSESSMENT: STUDY ATTRITION FLOWCHART



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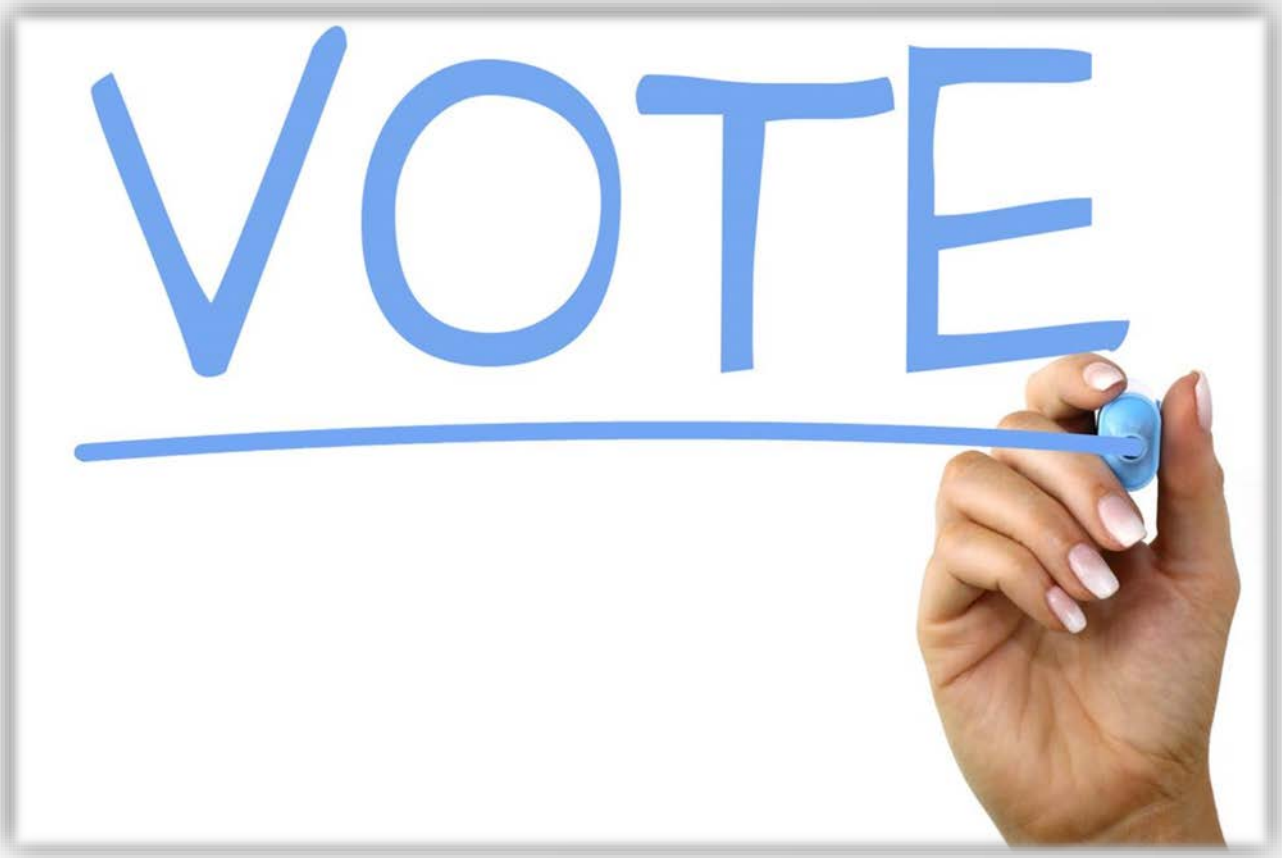
VOTING ON THE RECOMMENDATIONS

Recommendations and recommendation strengths voted on by work group during final meeting

Approved and adopted by simple majority (60%) when voting on every recommendation

If disagreement, further discussion to whether the disagreement could be resolved



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GUIDELINE LANGUAGE STEMS

GUIDELINE LANGUAGE STEMS	STRENGTH OF RECOMMENDATION
Strong evidence supports that the practitioner should/should not do X, because…	STRONG
Moderate evidence supports that the practitioner could/could not do X, because…	MODERATE
Limited evidence supports that the practitioner might/might not do X, because…	LIMITED
In the absence of reliable evidence, it is in the opinion of this guideline work group that…	CONSENSUS

PEER REVIEW

- Guideline draft sent for peer review to external experts
- Comments and draft of responses reviewed by work group members
- Recommendation changes required a majority vote by work group
- A detailed report of all resulting revisions is published with the guideline document

PUBLIC COMMENT

Following peer review modifications, CPG undergoes public commentary period

Comments are solicited from:

AAOS Board of Directors

AAOS Council on Research and Quality

AAOS Committee on Evidence-Based Quality and Value

AAOS Board of Councilors

AAOS Board of Specialty Societies

200 commentators have the opportunity to provide input

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FINAL MEETING

The work group is charged with:

- Review of data summaries
- Final recommendation language
- Rationale and risk/harm construction
- Future research

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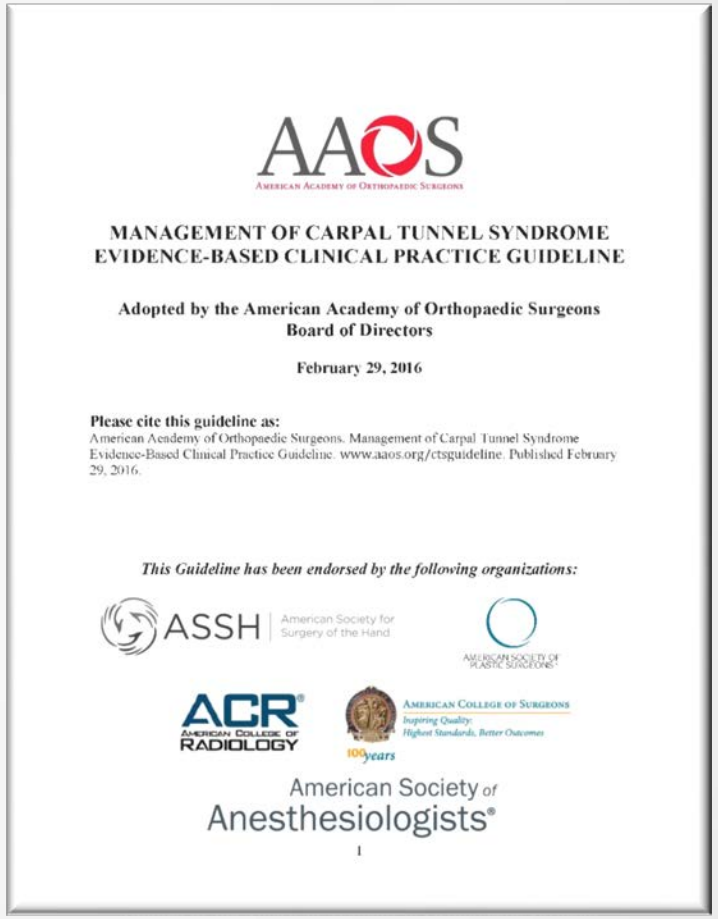
MANAGEMENT OF CARPAL TUNNEL SYNDROME CLINICAL PRACTICE GUIDELINE OVERVIEW

- Based on a systematic review of published studies
- Addresses the diagnosis and treatment of adult patients presenting with complaints which may be attributable to carpal tunnel syndrome
- Highlights limitations in literature and areas requiring future research
- Trained physicians and surgeons are intended users



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OBSERVATION

- Strong evidence supports Thenar atrophy is strongly associated with ruling-in carpal tunnel syndrome, but poorly associated with ruling-out carpal tunnel syndrome.

Strength of Recommendation: Strong 

PHYSICAL SIGNS

- Strong evidence supports not using the Phalen Test, Tinel Sign, Flick Sign, or Upper limb neurodynamic/nerve tension test (ULNT) criterion A/B as independent physical examination maneuvers to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome.

Strength of Recommendation: Strong 

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MANEUVERS

- Moderate evidence supports not using the following as independent physical examination maneuvers to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome:
  - Carpal Compression Test
  - Reverse Phalen Test
  - Thenar Weakness or Thumb Abduction Weakness or Abductor Pollicis Brevis Manual Muscle Testing
  - 2-Point Discrimination
  - Semmes-Weinstein Monofilament Test
  - CTS-Relief Maneuver (CTS-RM)
  - Pin Prick Sensory Deficit; Thumb or Index or Middle Finger
  - ULNT Criterion C
  - Tethered Median Nerve Stress Test
  - Vibration Perception-Tuning Fork
  - Scratch Collapse Test
  - Luthy Sign
  - Pinwheel

Strength of Recommendation: Moderate

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HISTORY INTERVIEW TOPICS

- Moderate evidence supports not using the following as independent history interview topics to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome:
  - Sex/Gender
  - Ethnicity
  - Bilateral Symptoms
  - Diabetes Mellitus
  - Duration of Symptoms
  - Patient Localization of Symptoms
  - Hand Dominance
  - Symptomatic Limb
  - Age
  - BMI

Strength of Recommendation: Moderate

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HAND-HELD NERVE CONDUCTION STUDY (NCS)

- Limited evidence supports that a hand-held nerve conduction study (NCS) device might be used for the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Limited 

MRI

- Moderate evidence supports not routinely using MRI for the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Moderate 

DIAGNOSTIC ULTRASOUND

- Limited evidence supports not routinely using ultrasound for the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Limited 

DIAGNOSTIC SCALES

- Moderate evidence supports that diagnostic questionnaires and/or electrodiagnostic studies could be used to aid the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Moderate

INCREASED RISK OF CTS

- Strong evidence supports that BMI and high hand/wrist repetition rate are associated with the increased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Strong 

INCREASED RISK OF CTS

- Moderate evidence supports that the following factors are associated with the increased risk of developing carpal tunnel syndrome (CTS):
  - Peri-Menopausal
  - Wrist Ratio/Index
  - Rheumatoid Arthritis
  - Psychosocial Factors
  - Distal Upper Extremity Tendiopathies
  - Gardening
  - ACGIH Hand Activity Level at or above Threshold
  - Assembly Line Work
  - Computer Work
  - Vibration
  - Tendonitis
  - Workplace Forceful Grip/Exertion

Strength of Recommendation: Moderate

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INCREASED RISK OF CTS

- Limited evidence supports that the following factors are associated with the increased risk of developing carpal tunnel syndrome (CTS):
  - Dialysis
  - Fibromyalgia
  - Varicosis
  - Distal Radius Fracture

Strength of Recommendation: Limited 

DECREASED RISK OF CTS

- Moderate evidence supports that physical activity/exercise is associated with a decreased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Moderate

FACTORS SHOWING NO ASSOCIATED RISK OF CTS

- Moderate evidence supports that the use of oral contraception and female hormone replacement therapy (HRT) are not associated with increased or decreased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Moderate 

FACTORS SHOWING NO ASSOCIATED RISK OF CTS

- Limited evidence supports that race/ethnicity and female education level are not associated with increased or decreased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Limited 

FACTORS SHOWING CONFLICTING RISK OF CTS

- Limited evidence supports that the following factors have conflicting results regarding the development of carpal tunnel syndrome (CTS):
  - Diabetes
  - Age
  - Genetics
  - Comorbid Drug Use
  - Smoking
  - Wrist Bending
  - Workplace

Strength of Recommendation: Limited 

IMMOBILIZATION

- Strong evidence supports that the use of immobilization (brace/splint/orthosis) should improve patient reported outcomes.

Strength of Recommendation: Strong 

STERIOD INJECTIONS

- Strong evidence supports that the use of steroid (methylprednisolone) injection should improve patient reported outcomes.

Strength of Recommendation: Strong 

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MAGNET THERAPY

- Strong evidence supports not using magnet therapy for the treatment of carpal tunnel syndrome.

Strength of Recommendation: Strong 

ORAL TREATMENTS

- Moderate evidence supports no benefit of oral treatments (diuretic, gabapentin, astaxanthin capsules, NSAIDs, or pyridoxine) compared to placebo.

Strength of Recommendation: Moderate

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ORAL STEROIDS

- Moderate evidence supports that oral steroids could improve patient reported outcomes as compared to placebo.

Strength of Recommendation: Moderate

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KETOPROFEN PHONOPHORESIS

- Moderate evidence supports that ketoprofen phonophoresis could provide reduction in pain compared to placebo.

Strength of Recommendation: Moderate 

THERAPEUTIC ULTRASOUND

- Limited evidence supports that therapeutic ultrasound might be effective compared to placebo.

Strength of Recommendation: Limited 

LASER THERAPY

- Limited evidence supports that laser therapy might be effective compared to placebo.

Strength of Recommendation: Limited 

SURGICAL RELEASE LOCATION

- Strong evidence supports that surgical release of the transverse carpal ligament should relieve symptoms and improve function.

Strength of Recommendation: Strong 

SURGICAL RELEASE PROCEDURE

- Limited evidence supports that if surgery is chosen, a practitioner might consider using endoscopic carpal tunnel release based on possible short term benefits.

Strength of Recommendation: Limited 

SURGICAL PROCEDURES VERSUS NONOPERATIVE TREATMENTS

- Strong evidence supports that surgical treatment of carpal tunnel syndrome should have a greater treatment benefit at 6 and 12 months as compared to splinting, NSAIDs/therapy, and a single steroid injection.

Strength of Recommendation: Strong 

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ADJUNCTIVE TECHNIQUES

- Moderate evidence supports that there is no benefit to routine inclusion of the following adjunctive techniques: epineurotomy, neurolysis, flexor tenosynovectomy, and lengthening/reconstruction of the flexor retinaculum (transverse carpal ligament).

Strength of Recommendation: Moderate 

BILATERAL VERSUS STAGED CARPAL TUNNEL RELEASE

- Limited evidence supports that simultaneous bilateral or staged endoscopic carpal tunnel release might be performed based on patient and surgeon preference. No evidence meeting the inclusion criteria was found addressing bilateral simultaneous open carpal tunnel release.

Strength of Recommendation: Limited 

LOCAL VERSUS INTRAVENOUS (IV) REGIONAL ANESTHESIA

- Limited evidence supports the use of local anesthesia rather than intravenous regional anesthesia (Bier block) because it might offer longer pain relief after carpal tunnel release; no evidence meeting our inclusion criteria was found comparing general anesthesia to either regional or local anesthesia for carpal tunnel surgery.

Strength of Recommendation: Limited 

BUFFERED VERSUS PLAIN LIDOCAINE

- Moderate evidence supports the use of buffered lidocaine rather than plain lidocaine for local anesthesia because it could result in less injection pain.

Strength of Recommendation: Moderate 

ASPIRIN USE

- Limited evidence supports that the patient might continue the use of aspirin perioperatively; no evidence meeting our inclusion criteria addressed other anticoagulants.

Strength of Recommendation: Limited 

PREOPERATIVE ANTIBIOTICS

- Limited evidence supports that there is no benefit for routine use of prophylactic antibiotics prior to carpal tunnel release because there is no demonstrated reduction in postoperative surgical site infection.

Strength of Recommendation: Limited 

SUPERVISED VERSUS HOME THERAPY

- Moderate evidence supports no additional benefit to routine supervised therapy over home programs in the immediate postoperative period. No evidence meeting the inclusion criteria was found comparing the potential benefit of exercise versus no exercise after surgery.

Strength of Recommendation: Moderate 

POSTOPERATIVE IMMOBILIZATION

- Strong evidence supports no benefit to routine postoperative immobilization after carpal tunnel release.

Strength of Recommendation: Strong 

FUTURE RESEARCH

- A significant obstacle to evaluating pathways to the treatment of CTS is the absence of a widely accepted reference standard for the diagnosis. An effort to achieve consensus among the many clinical disciplines which evaluate and treat CTS is an important goal of future research in this area. If consensus of this nature can be established, then a clear and consistent case definition should allow a comparison of treatment options as well as an evaluation of the impact of workplace exposures on the development of CTS symptoms.

FUTURE RESEARCH – PHYSICAL EXAM

- Future studies should define diagnostic reference standard. The development of standardized diagnostic scales and stand-alone maneuvers or tests should be evaluated against a reference standard. Studies should include appropriate blinding as well as timing between tests to allow for unbiased and accurate assessments.

FUTURE RESEARCH – HISTORY INTERVIEW TOPICS

- Future studies should evaluate and use standardized language for describing symptoms and their severity. Standardized scales and stand-alone history interview topics should be evaluated against a reference standard.

FUTURE RESEARCH – PATIENT REPORTED NUMBNESS AND PAIN

- Future studies should evaluate and use standardized language for describing symptoms and their severity. Standardized scales and stand-alone history interview topics should be evaluated against a reference standard.

FUTURE RESEARCH – HAND-HELD NERVE CONDUCTION STUDY

- More high quality studies are needed to confirm the utility of this method in comparisoned to electrodiagnostic studies.

FUTURE RESEARCH – MRI

- In order for imaging modalities to be effective in diagnosis of CTS consensus on the optimal location for the measurements and threshold values for parameters such as cross-sectional area are required.

FUTURE RESEARCH – DIGNOSTIC ULTRASOUND

- In order for imaging modalities to be effective in diagnosis of CTS consensus on the optimal location for the measurements and threshold values for parameters such as cross-sectional area are required. Further high quality studies are needed to determine the utility of hypervascularity of the median nerve by ultrasound in the diagnosis of CTS.

FUTURE RESEARCH – DIAGNOSTIC SCALES

- Establishing consensus on a reference standard for the diagnosis for CTS is the most important research goal in this area.

FUTURE RESEARCH – INCREASED RISK OF CTS

- Studies should be conducted to identify objective methods for assessing workplace physical factors in order to improve the precision of risk estimation and improve confidence in thresholds of injury. Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS. Studies of risk should include proper control for confounding as in a logistic regression analysis with appropriate population sizes and associated odds ratios.

FUTURE RESEARCH – DECREASED RISK OF CTS

- The moderate quality studies finding that found a reduction in risk for CTS with vigorous exercise are intriguing. There should be additional research to confirm these findings and identify the specific types and amount of exercise that may be effective. There should be studies to investigate apportionment of risk between personal and workplace factors. Studies should be conducted to identify objective methods for assessing workplace physical factors in order to improve the precision of risk estimation and improve confidence in thresholds of injury. Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS. More research into the relationship between diabetes and CTS should be done, as the conflicting results indicate a possible association between these conditions. Studies of risk should include proper control for confounding as in a logistic regression analysis with appropriate population sizes and associated odds ratios.

FUTURE RESEARCH – FACTORS SHOWING CONFLICTING RISK OF CTS

- There should be studies to investigate apportionment of risk between personal and workplace factors. Studies should be conducted to identify objective methods for assessing workplace physical factors in order to improve the precision of risk estimation and improve confidence in thresholds of injury. Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS. More research into the relationship between diabetes and CTS should be done, as the conflicting results indicate a possible association between these conditions. Studies of risk should include proper control for confounding as in a logistic regression analysis with appropriate population sizes and associated odds ratios.

FUTURE RESEARCH – NONOPERATIVE TREATMENTS

- Further research in acupuncture is warranted. In a prospective randomized double-blind controlled study, Yao et al evaluated the efficacy of acupuncture (weekly sessions for 6 weeks) versus placebo to treat carpal tunnel syndrome. No significant measures of improvement were noted. Soft tissue manipulation: further research in manipulation is warranted. Many different techniques are utilized and the terminology distinguishing them is loosely utilized. Further research into linseed oil's biological mechanism of action, along with technical refinements and specifics in its manufacture are warranted.

FUTURE RESEARCH – SURGICAL RELEASE

- Future research should focus on stratifying treatment outcomes based on preoperative symptom severity.

FUTURE RESEARCH – BILATERAL VERSUS STAGED CARPAL TUNNEL RELEASE

- Studies of simultaneous versus staged open carpal tunnel releases with adequate follow up would be helpful in elucidating whether simultaneous open release should be considered as a treatment option.

  Studies which define return to work status by rigorous, objective criteria would be helpful to define the strength of the recommendation regarding simultaneous releases.

FUTURE RESEARCH – LOCAL VS INTRAVENOUS REGIONAL ANESTHESIA

- No evidence meeting our inclusion criteria was found specifically comparing local anesthesia to either general anesthesia or regional anesthesia using brachial plexus blocks. Studies evaluating the role of regional anesthesia administered via brachial plexus block might be valuable given the post-operative analgesia conferred by these methods. In the existing literature the main advantage of local infiltration compared with intravenous regional anesthesia was post-operative pain relief for up to two hours.

FUTURE RESEARCH – BUFFERED VS PLAIN LIDOCAINE

- No evidence meeting our inclusion criteria was found specifically comparing local anesthesia to either general anesthesia or regional anesthesia using brachial plexus blocks. Studies evaluating the role of regional anesthesia administered via brachial plexus block might be valuable given the post-operative analgesia conferred by these methods. In the existing literature the main advantage of local infiltration compared with intravenous regional anesthesia was post-operative pain relief for up to two hours.

FUTURE RESEARCH – ASPIRIN USE

- Investigate anticoagulant use in carpal tunnel surgery using different types of anesthesia and with and without the use of a tourniquet as well. More data is needed on other anticoagulant types including NSAIDs.

FUTURE RESEARCH – PREOPERATIVE ANTIBIOTICS

- Future research should consider reporting on the associated cost, value, and quality of life as they relate to antibiotics. Future research should also focus on the efficacy of preoperative antibiotic treatment in diabetics and/or other immunocompromised populations.

FUTURE RESEARCH – SUPERVISED VS HOME THERAPY

- More trials comparing different approaches are needed. These studies should include validated measures of patient-reported outcomes, impairment, adherence and costs. Better description of the characteristics of the exercise and education content, provider and delivery are needed. Studies that address how to identify subsets that need different approaches (treatment-based prediction rules) or targeting of interventions based on different surgical approaches, patient presentations or individual circumstances are also needed.

FUTURE RESEARCH – POSTOPERATIVE IMMOBILIZATION

- Future research should focus on determining if there is a benefit to beginning early range of motion exercises and when a patient may return to unrestricted activities.

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Quality is Our Image

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CARPAL TUNNEL SYNDROME CASE STUDIES

Appropriate use criteria (AUC) provide treatment recommendations on a patient-specific level using evidence from AAOS clinical practice guidelines, along with clinician expertise and experience. A multidisciplinary clinician writing panel creates realistic patient profiles who may present with a particular orthopaedic disease in a clinical setting. A separate multidisciplinary clinician voting panel uses a modified Delphi method to rate the appropriateness of various procedures for those patient profiles.

The American Academy of Orthopaedic Surgeons adopted the AUC for the Management of Carpal Tunnel Syndrome on December 9, 2016. This AUC was developed to improve patient care and obtain the best outcomes while considering the subtleties and distinctions necessary in making clinical decisions for the management of carpal tunnel syndrome.

The following three clinical scenarios demonstrate how the AUC can be used in the decision-making process. Users can easily access this valuable tool via OrthoGuidlines
http://www.orthoguidelines.org/go/auc/default.cfm?auc_id=224989&actionxm=Terms

Case Study

A 41-year old woman presented with numbness and tingling in her right hand that had persisted for 5 months. She was otherwise healthy and worked as a beautician. The symptoms were confined to the median nerve distribution of her right hand. She felt that the symptoms were fairly severe and were beginning to affect her work, because she had to take frequent breaks to “shake out” her hands. She reported that she would wake up on a nightly basis with burning pain in her hand and similarly had to “shake it out.”

Two months prior, her primary care physician had suggested that she try night splinting. Although splinting resulted in transient improvement, her symptoms continued to progress. She reported dropping things sometimes, but felt that this was mostly the result of numbness.

PHYSICAL EXAMINATION

On physical examination, the patient exhibited full range of motion and demonstrated no atrophy or weakness. The Tinel sign was positive in the right hand, and the Phalen test was positive bilaterally; however, the Phalen test elicited a result more quickly in the right hand. Sensation was intact and symmetric based on Semmes-Weinstein monofilament testing and static two-point discrimination.

The patient scored 16.5 points out of a total of 26 points on the CTS-6, with numbness in the median nerve territory (3.5 points), nocturnal numbness (4 points), Phalen test (5 points), and a positive Tinel sign (4 points) (See “Appendix A. Diagnostic Tools,” in the full AUC: http://www.aaos.org/ctsauc). This placed the patient in the category of High Probability for CTS. No electrodiagnostic testing was performed.

DISCUSSION

In terms of clinical severity, this patient met the criteria for Moderate Severity, examples of which include “pain/sensory disturbances, tingling, frequent activity-related symptoms, and/or difficulty with fine motor coordination.”1 Had the patient exhibited thenar atrophy or measurable weakness, the category High Severity would have been selected. In terms of Response to Previous Treatment, the patient exhibited “[p]ositive response to non-operative treatment and subsequent recurrence of symptoms.”

Based on these criteria, the median score for carpal tunnel release was 8 out of 9, making it the highest rated appropriate treatment. Other treatments considered appropriate for this patient include continued splinting, steroid injection, or obtaining EDSs. This scenario demonstrates that, given a high probability for CTS based on clinical presentation and examination, EDSs are not necessary to confirm the diagnosis before proceeding with carpal tunnel release. The AUC does not comment on open, mini-open, or endoscopic release except to note that they are all reasonable and appropriate options in cases in which carpal tunnel release is indicated.

Case Study 2

A 65-year-old woman with mild type II diabetes that was controlled with medication and diet reported experiencing episodic numbness and pain in her hands, mostly on the right, for 3 to 4 years. The numbness and pain had recently begun bothering her more at night, waking her up once or twice per week. She had difficulty assessing the location of the pain and numbness and indicated that they affected all her fingers, including her palm. She had not received prior treatment. She had not experienced neck pain or radiating pain, more proximal numbness, or weakness or coordination problems, and she reported that her diabetes had been well-controlled overall. She described her symptoms as mild overall, but bothersome.

PHYSICAL EXAMINATION

The patient had a negative Tinel sign and a Phalen test, leading to paresthesia in the ring and long fingers. She had normal sensation and no evidence of motor weakness or atrophy. The patient experienced vague tenderness to palpation over the base of the palm and volar wrist, but the Watson test was negative, there was no evident swelling or erythema, and radiographs were normal.

DISCUSSION

The patient was found to have a CTS-6 score of 9 (nocturnal numbness, 4 points; positive Phalen test, 5 points), which falls in the Moderate Probability category. Additionally, according to the Katz Hand Diagram, this patient fell into the Probable Pattern category based on the presence of pain/numbness in the palm (See "Appendix A. Diagnostic Tools," in the full AUC: http://www.aaos.org/ctsauc). The Symptom Severity for this patient was Low, based on her episodic/infrequent symptoms and her own assessment.

Based on the AUC, the appropriate course of action for this patient would consist of nonsurgical treatment or EDSs. Nonsurgical treatment could include a steroid injection, splints, or oral steroids/ketoprofen phonophoresis. Carpal tunnel release would be unlikely to be appropriate at this stage.

Case Study 3

A 54-year-old man who worked as a custodian in a nursing facility presented with pain in both hands that had persisted for 3 months, along with vague numbness and tingling. He declared this to be a workers' compensation injury and was sent to an occupational health clinic, where he was given splints to wear. The patient claims that he was compliant with splint usage, and he wore them to the orthopaedic consultation. The splints did not help the patient, and the occupational health physician ordered bilateral EDSs. The nerve conduction velocity study suggested moderate CTS on the left, mild CTS on the right, and mild cubital tunnel syndrome bilaterally. The electromyographic component of the examination was normal. At that point, the patient was referred to the orthopaedic physician for further evaluation.

PHYSICAL EXAMINATION

On examination, the patient had diffuse tenderness over both hands and withdrew from attempted palpation. The Tinel sign was absent, producing localized pain over the volar wrist but no paresthesia. The Phalen test was negative. The Tinel sign was negative over the cubital tunnels bilaterally. Sensation was intact bilaterally, with normal static two-point discrimination.

DISCUSSION

In this patient, the likelihood of CTS was low, with a CTS-6 score of <5. Electrodiagnostic testing was suggestive of "moderate median neuropathy at the wrist." In terms of clinical severity, the patient met the criteria for Moderate Severity and exhibited Failure to Respond to Non-Operative Treatment. The two most appropriate options for this patient would be to investigate alternative diagnoses or attempt a diagnostic/therapeutic steroid injection. In this patient, the median rating for carpal tunnel release was 6 out of 9, or May Be Appropriate. In this case, the positive EDSs stood in contrast to both an equivocal presentation and physical examination and failure of nonsurgical treatment, which is suggestive of the potential for a false-positive electrodiagnostic study result and resulted in the recommendation to consider alternative diagnoses.

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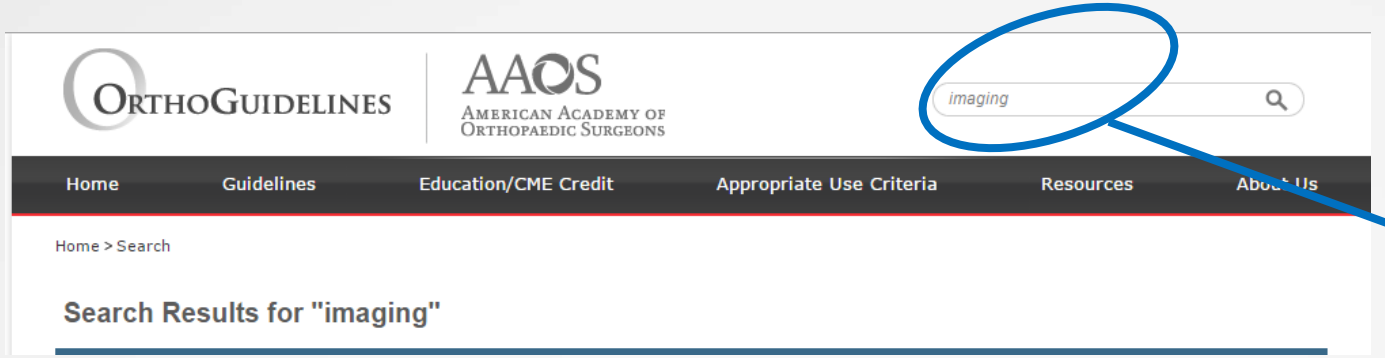
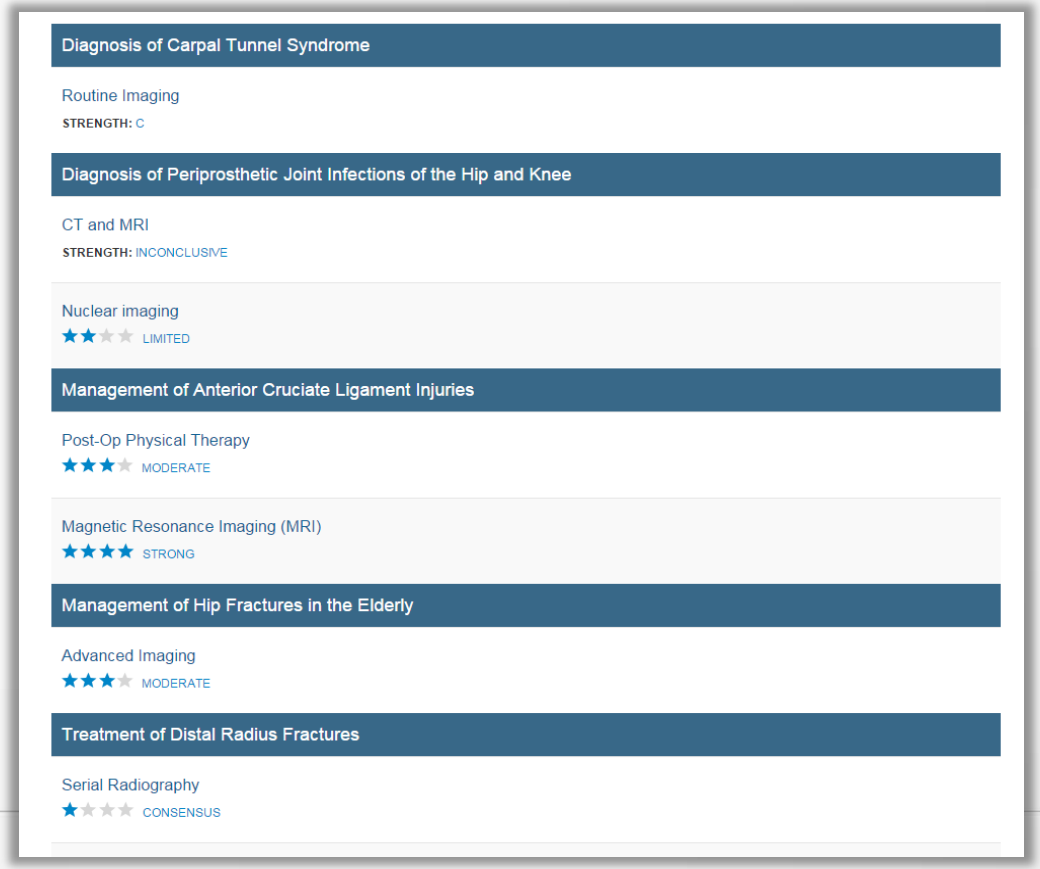


Imaging

Search across all CPG and AUC Via a Single Keyword Search



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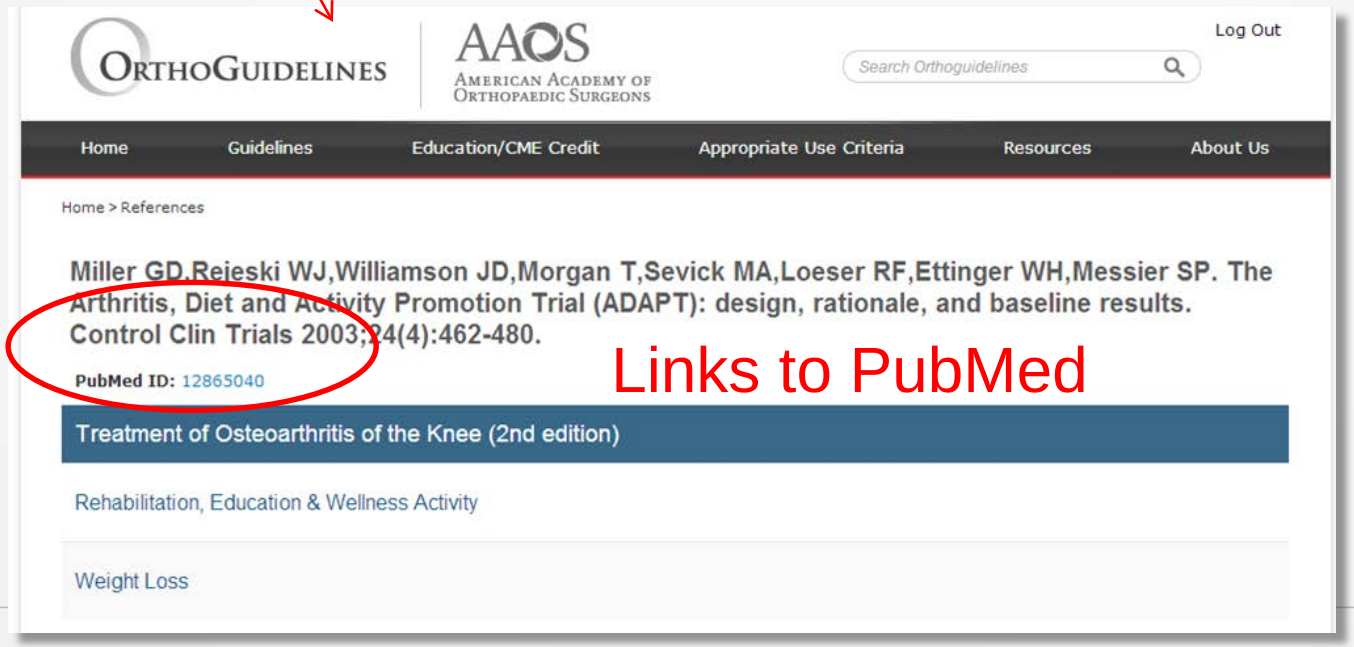
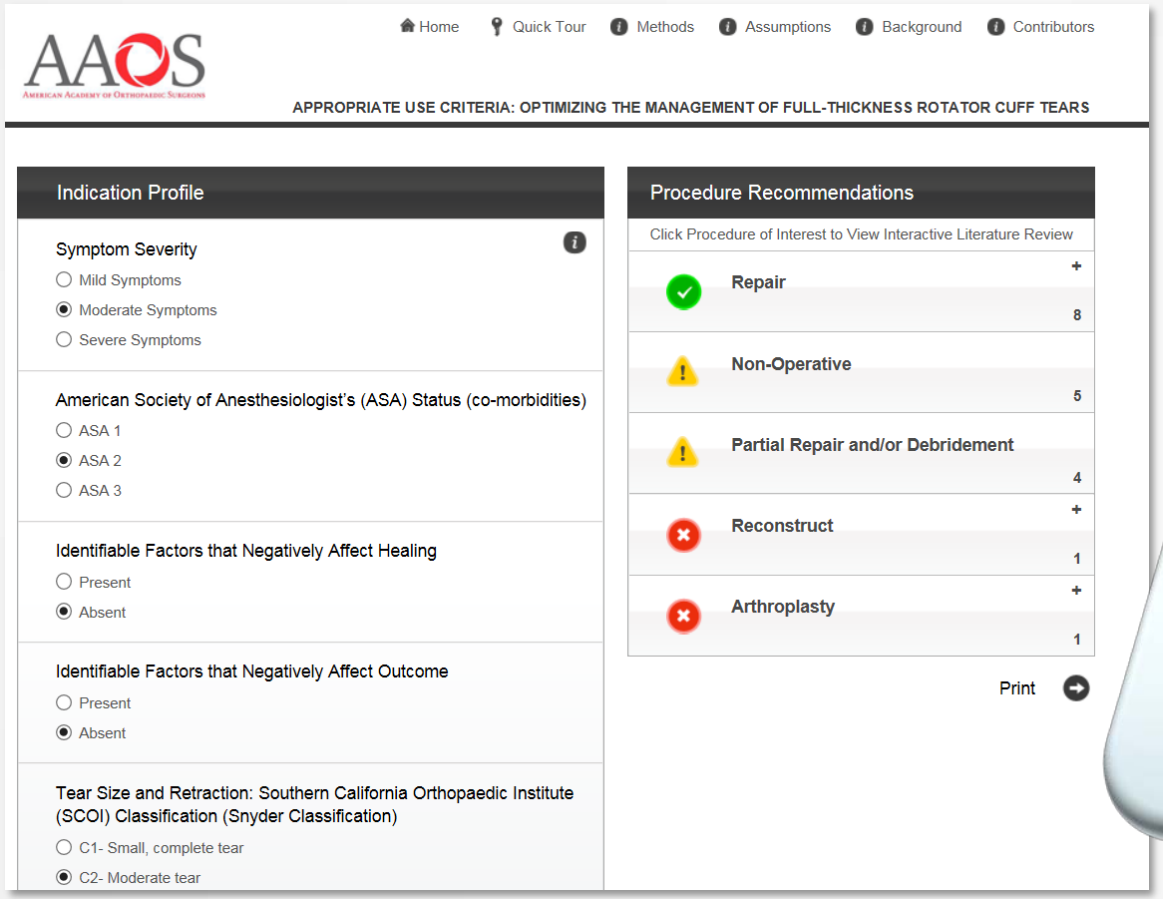
References provided for each recommendation

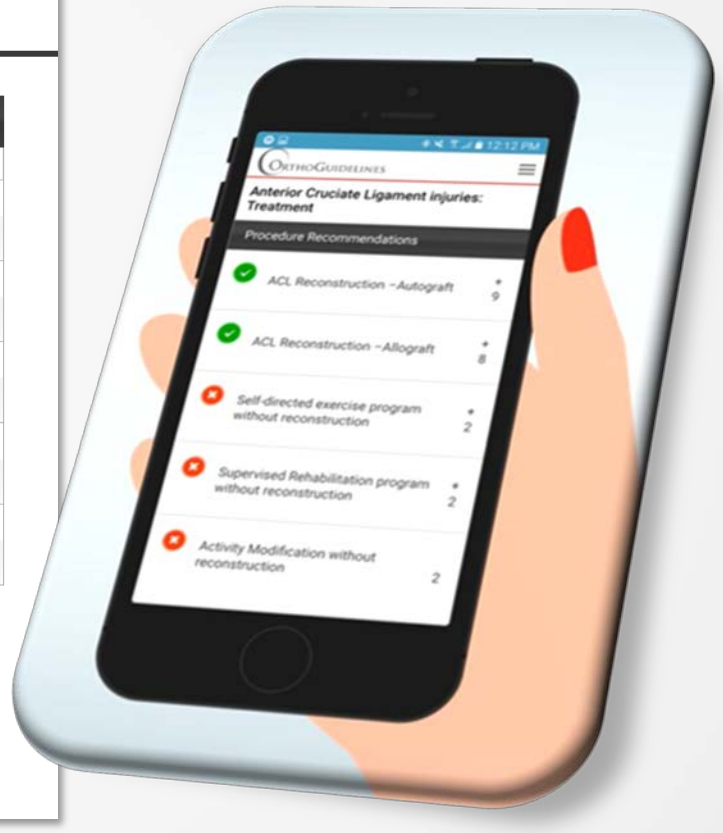
Miller GD,Rejeski WJ,Williamson JD,Morgan T,Sevick MA,Loeser RF,Ettinger WH,Messier SP. The Arthritis, Diet and Activity Promotion Trial (ADAPT): design, rationale, and baseline results. Control Clin Trials 2003;24(4):462-480.

(20) Lorig K, Lubeck D, Kraines RG, Seleznick M, Holan HR. Outcomes of self-help education for patients with arthritis. Arthritis Rheum 1985;28:680-685



Appropriate Use Criteria Tool





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PUBLISHED CLINICAL PRACTICE GUIDELINES

- Acute Achilles Tendon Rupture
- Acute Compartment Syndrome
- Anterior Cruciate Ligament Injuries
- Carpal Tunnel Syndrome
- Diagnosis and Prevention of Periprosthetic Joint Infections
- Distal Radius Fractures
- Glenohumeral Joint Osteoarthritis
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- Osteoarthritis of the Hip
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- Osteochondritis Dissecans
- Pediatric Developmental Dysplasia of the Hip in infants up to Six Months
- Pediatric Diaphyseal Femur Fractures
- Pediatric Supracondylar Humerus Fractures
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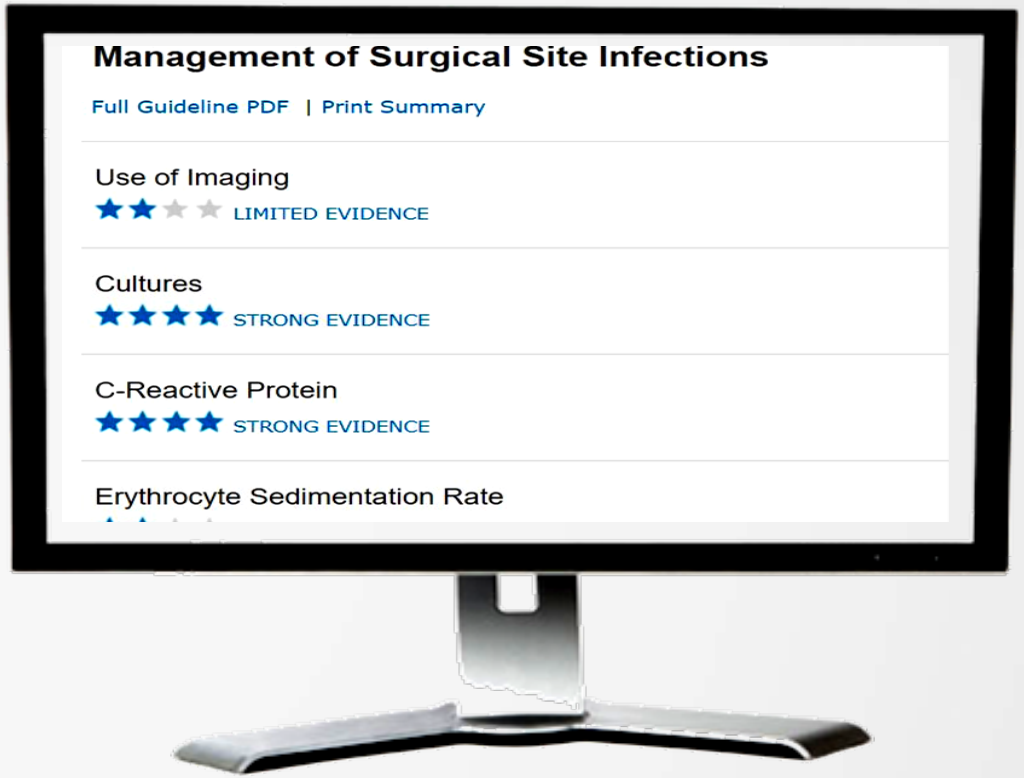
- Rotator Cuff Injuries
- Surgical Site Infections
- VTE Disease in Patients Undergoing Elective Hip & Knee Arthroplasty
- Tranexamic Acid in Total Joint Arthroplasty (Endorsement)
- Use of Imaging Prior to Referral to a Musculoskeletal Oncologist (Endorsement)



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