



# Value of implementation of guidelines in practice of orthopedic surgery

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## Abstract

It's important for patients to receive the best possible care, and clinical practice guidelines (CPGs) can help make that happen. CPGs are statements that include recommendations based on a careful review of evidence and an assessment of different care options, all with the goal of optimizing patient care. In this brief, we will walk through the process of guideline development according to the World Health Organization (WHO) and the Institute of Medicine (IOM), from planning to dissemination and implementation. The orthopedic literature is full of high-quality studies in almost all subspecialties, highlighting the value of evidence-based practice in orthopedic surgery. With these guidelines in place, we can work together to ensure that patients receive the best possible care. It is important to follow the evidence to benefit doctors, patients, and policymakers. As a nation with a long history in medicine and orthopedics, we should establish our own recommendations to follow. Since we deal with some different and more aggressive injuries than other developed countries, describing these injuries and how to deal with them will benefit our patients and colleagues, and contribute to the orthopedic literature in general. We have no doubt that once our guidelines are developed, they will be respected and followed by many orthopedic centers outside of Egypt.

**Keywords:** Clinical practice guidelines (CPGs), Orthopedic, Arthroplasty, Arthroscopy, and surgery.

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## 1. Introduction

Clinical practice guidelines (CPGs) are statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options [1]. We will demonstrate -in brief- the process of guidelines development according to WHO and the Institute of Medicine (IOM), starting from the planning of guidelines to dissemination and implementation. To understand the role of guidelines in orthopedic surgery, we will review the history of guidelines and evidence-based practice in orthopedic surgery. In 1889, the importance of evidence-based practice was pointed out for the first time [2]. As one of the most prestigious orthopedic associations, the American Academy of Orthopedic Surgeons (AAOS) is a great example of understanding guideline development in orthopedic surgery. The literature shows that guideline implementation improves medical practice and patient outcomes.

## 2 Guidelines development

### 2.1 Planning

As with anything else, good planning will lead to good guidelines. First, there must be a need for it; otherwise, there is no sense in creating it. Then, some questions must be answered about which departments will be involved, how soon it is required, whether adequate funds are available, and whom the guidelines are trying to reach [3,5].

### 2.2 Guidelines Development Group (GDG)

The group should consist of a mix of methodological specialists, doctors, and populations that the guideline is anticipated to impact [1-6]. In the guideline development process, all participants must declare any conflict of interest. Most guideline development group members should be free from conflict of interest. Managing conflict of interests ranges from only declaring at the meeting and reporting in the final guideline to prohibiting participation. The actual guideline document must summarize how the conflict-of-interest declarations were gathered, a list of any declared conflicts, and a brief

explanation of how they were handled. Additionally, this must be reported if no conflict was declared [3,7].

### 2.3 Formulation of questions

The well-known PICO format is the best way to formulate the question. It allows for an organized search of the literature because the answers to the question will serve as a basis for the guideline. PICO refers to four components that should be present in a query directing a methodological search of the evidence: Population, Intervention, Comparator, and Outcome [3,8].

### 2.4 Evidence retrieval

Conducting a systematic review with questions unique to the intervention(s) that the guideline is likely to suggest is an effective strategy. If properly executed, systematic reviews lower the possibility of selective citation and increase the accuracy and dependability of conclusions. If there are any recent, pertinent, and high-caliber systematic reviews, they should be used. If necessary, updates take less time and money to complete than fresh evaluations [3].

### 2.5 Evidence assessment

A systematic review of gathered and synthesized evidence must have its level of quality evaluated. The "degree to which one may be confident that an estimate of the effect or association is correct" is how one defines the quality of the evidence. The GRADE (Grading of Recommendations, Assessment, Development and Evaluation) method grades recommendations, develops them, and reports their findings [3,9].

### 2.6 Recommendations development:

A detailed description of the benefits and drawbacks that may result from the recommendation, together with an explanation of the reasons behind it should be provided for each recommendation [1].

### 2.7 Peer review

Peer review should be done both during the creation of guidelines and before the draft is ready for publication. The public should be given access to a draft of the CPG at the external review stage or just after it (i.e., before the final draft) for feedback [1].

### 2.8 Guideline format

All guidelines need to have an executive summary, a major body, and appendices. The 1-3-25 rule stipulates that these sections should have an executive summary of one page, a main body of three pages, and 25 pages of appendices, is a standard recommendation for their length [3].

### 2.9 Dissemination and update

Dissemination involves making guidelines accessible, advertising their availability, and distributing them widely. This can be done through online publication, journals publication or mobile applications. Guidelines should include a review by date that specifies how long they are anticipated to be effective. A minimum of two years and a maximum of five years are recommended for standard and comprehensive recommendations [3].

### 2.10 Implementation

To make implementation easier, various derivative papers or tools can be created. A slide set containing the guidelines' content, a "how to" manual or handbook, a flow chart, decision aid, or algorithm, fact sheets, quality indicators, checklists, application tools, templates, etc. are some examples of these publications or tools [3,4].

### 2.11 Evaluation and monitoring

It is important to evaluate the guideline's effectiveness. The recommendation should have performance or result benchmarks that can be tracked for the key recommendations. Performance indicators could be connected to: guidelines dissemination, practice performance changes, health outcomes changes, end user knowledge and comprehension changes, and economic repercussions [3].

## 3 Guidelines in orthopedic surgery

### 3.1 History

"Hypertrophy of 1 lower extremity" This was the title of the lead article in the proceedings of the American orthopedic association in 1889. The author presented a six-year-old kid with a diseased leg 3/4 of an inch longer than the other. After the failure of the bandage, the author only prescribed a higher shoe for the normal leg as a relief. After that a different physician examined the patient and advised amputation which was done. The doctor diagnosed the patient to have congenital occlusion and dilatation of lymph channels [10]. After this published presentation, additional experts engaged in debate. one physician said that he had a patient with a similar condition. He prescribed only a higher shoe for the normal leg after stating that he didn't know what else to do. Another surgeon had a similar case but with a different intervention. sciatic nerve stretch was what the doctor did for the diseased leg, and it seemed to decrease the size of the leg [10]. These surgeons, who were all from different cities, provided completely varied therapies for the same condition, including amputation, sciatic nerve stretching, and shoe lifts. It's interesting how one discussion participant raised the following suggestion after recognizing the need to balance the conflicting viewpoints: "Would it not be in accordance with the purposes of this Association to appoint a committee to investigate this subject, taking patients... and treating them?". Could it be that the significance of sizable clinical trials was recognized a century ago [10]? Take this first example from the 19th century and fast-forward to 2000, a full century later. The same journal, now known as the Journal of Bone and Joint Surgery, added a new section called "Evidence-Based Orthopedics" in response to the requirement to combine clinical experience with the best systematic research available [11].

### 3.2 AAOS guidelines as an example

Frederick Azar, MD, president of the AAOS and chief of staff at the Campbell Clinic in Memphis, has made an interview explaining how CPGs are developed and disseminated in the AAOS. He declared that CPGs that are based on the assessment of high-level clinical and scientific knowledge and approved ways to therapy should function as an educational tool [12]. He pointed out that the work group develops questions, chooses the inclusion criteria, and then

conducts a systematic literature review with the help of a qualified medical librarian. Finding the best research on the subject is the main goal of the literature review. The AAOS evidence-based process evaluates all studies in accordance with quality and applicability standards [12].

### 3.2.1 Peer review

According to the AAOS website, the CPG recommendations are ready for peer review after the work group has finished developing them. The Guidelines Oversight Committee (GOC), the Evidence-Based Quality and Value Committee (EBQV), and peer reviewers from outside specialist societies all participate in a minimum 30-day peer review process, according to the AAOS [12]. James O. Sanders, MD, et al have made a comparison of the IOM standard to the AAOS CPG process and showed that both agree on establishing transparency, Clinical practice Guideline- systematic review intersection, establishing evidence foundations for and rating strength of recommendations, articulation of recommendations, external review and updating the guidelines, while they differ in that IOM standards managed conflict of interests while AAOS didn't permit it, Also AAOS started to involve patients in the guidelines development group[13].

## 3.2.2 Evaluation of guidelines

### 3.2.2.1 Right checklist

Using the RIGHT (Reporting Items for practice Guidelines in Healthcare) checklist to evaluate the advantages and disadvantages of CPGs released by the American Academy of Orthopedic Surgeons (AAOS), Keith Fischbeck and colleagues published a study in the Journal of the American Osteopathic Association in February 2020 [14]. Keith Fischbeck et al concluded that overall, the AAOS standards addressed a few of the RIGHT checklist's critical suggestions. End users will be helped to implement guidelines more effectively in practice by clear, specific recommendations contained within the guidelines. Physicians can be certain that the advice they are putting into practice is supported by evidence-based medical practice when the recommendations are confirmed to be strong. The supporting evidence is certain in each guideline [14].

### 3.2.2.2 AGREE II

Another way to evaluate guidelines is using the AGREE II tool. A validated questionnaire called AGREE II (Advancing Guideline Development, Reporting and Evaluation in Health Care) is used to evaluate the methodological strength of clinical practice guidelines. It was the most efficient technique for guideline assessment according to a systematic study of 24 appraisal methods used to evaluate the methodologic quality of clinical practice guidelines [15]. Sabharwal et al. published an interesting study in 2014 in which they assessed the guidelines of the AAOS using AGREE II instrument. 14 guidelines, all published AAOS guidelines at that date, were assessed by three independent assessors. They concluded that the quality of the guidelines was very high, but the applicability was very poor [16]. AGREE II evaluates the presentation and development of guidelines for methodologic quality. Although guidelines might have strong techniques, they might not have enough evidence to support them. Of course, this would be a limitation of using Adawy et al., 2023

this system to evaluate guidelines, and Sabharwal et al. stated this as a limitation of their study [16].

### 3.2.3 Appropriate Use Criteria (AUC)

Evidence-based guidelines let us know whether a method or service is effective. They are less useful, nevertheless, in describing when or for whom that treatment or service should be carried out. AUCs define when a procedure should be carried out. Physicians must still make decisions regarding patient treatment even without strong evidence or sufficient detail [13]. Orthopedic surgeons must have access to CPGs and AUCs at the bedside in order to find them clinically useful. Applications for smartphones have been created to facilitate decision-making. For example, the mobile app for the AUC on distal radius fractures lets the surgeon choose the patient and fracture characteristics before offering specific suggestions [13].

## 4 Value of evidence-based practice in orthopedic surgery

In orthopedic surgery, the practice was based on experience rather than evidence till the past one or two decades. So, it is not odd to come across this article published in the journal of bone and joint surgery in 2005 titled "The level of evidence in orthopedic journals". It shows that only 11% of the orthopedic literature was of level I, high-quality evidence. Obviously, there was a great need to develop more randomized trials [17]. Evidence-based practice has been uprising in our field in the last few years and it appears that this is growing. Here is an interesting study published in 2020 under the name of "Evidence-based practice versus experience-based practice in orthopedics". They concluded that experience-based practice is comparably more common among orthopedic surgeons in practice. Future orthopedic surgeons rely more on research than experience when treating patients [18]. In the following, we will highlight some of the most recent high-quality studies in different subspecialties in orthopedic surgery to see the impact of evidence-based practice on surgeons, patients, and policymakers.

## 4.1 Trauma

### 4.1.1 A Trial of Wound Irrigation

In the Initial Management of Open Fracture Wounds, the 2015 publication of the Fluid Lavage of Open Wounds (FLOW) study offers as a prime illustration of how large-scale trials can affect orthopedic practice. Researchers designed to look into how patients with open extremities fractures respond to different irrigation pressures, including high (20 psi), low (5-10 psi), and extremely low (1-2 psi). Researchers discovered no significant changes in irrigation pressures between the three treatment arms, with high-pressure, low-pressure, and very low-pressure groups [19]. In March 2022, AAOS published a guideline on initially managing open fractures to reduce infection. The FLOW trial was one of many trials that formed the foundation of this recommendation [20].

### 4.1.2 Improving outcomes in hip fracture care

Fracture fixation using alternative implants to treat hip fracture (FAITH): an international, multicenter, randomized controlled trial. In the FAITH study, patients were randomly assigned to receive sliding hip screws or cancellous screws for fixation. Reoperation risk over a 24-month period was the primary outcome. Avascular necrosis

was considerably higher in the sliding hip screw arm compared to the cancellous screw arm, even though overall reoperation rates did not differ significantly between the two treatment arms. Additionally, subgroup analyses showed that patients with displaced fractures, fractures at the base of the femoral neck, and patients who smoked both before and after surgery had fewer reoperations after receiving sliding hip screws. Although both interventions may be utilized with comparable effectiveness at first glance, this experiment found differences that contributed to the recovery of patient subsets, further supporting the idea of specific and tailored patient care in orthopedics [21]. Liberal or restrictive transfusion in high-risk patients after hip surgery trial. This trial examined whether individuals with postoperative hip fractures would recover and function more effectively if the hemoglobin threshold was greater. Researchers randomly assigned 2016 patients to either a restrictive transfusion approach (hemoglobin threshold of 8 g per deciliter or symptomatic anemia) or a liberal transfusion strategy (hemoglobin threshold of 10 g per deciliter). The researchers discovered that there was no difference between the two groups, contrary to their initial hypothesis that higher hemoglobin transfusion trigger levels would reduce patient mortality and reduce the need for human help when moving from one place to another [22]. In December 2021, AAOS published a guideline recommending this same conclusion. Again, they listed this trial among the studies on which their recommendation was based [23]. Early and ultra-early surgery in hip fracture patients improves survival. In June 2011, the National Institute for Health, and Clinical Excellence (NICE) for England and Wales published its first guidelines on the treatment of hip fractures, emphasizing the necessity of surgery the same day or the next day following admission. This study investigates whether surgery performed before a 36-hour watershed improves survival in order to address concerns identified by NICE on surgical time. At the end they concluded that rapid surgery is linked to a higher patient survival rate. Surgery performed very quickly (within 12 hours) lowers the chance of hospital death [24]. It is worth mentioning that AAOS also recommends that the surgery in hip fractures patients should be within the first 24-48 hours. This was in the guidelines for the management of hip fractures in elderly patients under the section on surgical timing, which was published in December 2021 [25].

## 4.2 Arthroscopy and sports

### 4.2.1 Shift in treating meniscal tears.

Meniscal tears are a very common problem and treating them arthroscopically is one of the most common orthopedic surgeries worldwide. Researchers showed that 68% of patients had satisfactory or outstanding results after having a total meniscectomy after 10–30 years in one of the earliest meniscectomy trials published in 1969 [26]. As further trials looked at this treatment, partial meniscectomy became more prevalent in modern practice. Historical evidence supporting partial meniscectomy dates to a comparison study published in the *Journal of Bone and Joint Surgery* in 1983. In this study, 90% of patients who underwent partial meniscectomy experienced positive outcomes, compared to 68% of patients who underwent full meniscectomy [27].

Modern studies have determined the therapeutic benefit of the partial operation compared to nonsurgical treatment, going beyond analyzing the efficacy of the partial procedure to total. A recent multicenter randomized trial investigated the effectiveness of arthroscopic partial meniscectomy compared to physical therapy in patients presenting with degenerative meniscal tears in 2013. The results were reported in *The New England Journal of Medicine*. The improvement of functional outcomes as determined by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) physical-function score did not statistically differ between the two groups at the end of the 6-month follow-up. However, it was noticed that during the 6-month follow-up, 30% of the physiotherapy only group had received surgery [28]. Another significant trial contrasted partial meniscectomy with sham surgery and was also published in *The New England Journal of Medicine* in 2013. At the 12-month follow-up, it is interesting to note that both groups had dramatically improved results with no statistically significant differences between the two groups [29]. On the other hand, when we look at AAOS guidelines, a strange thing will come up. In spite of the direction of the recent best evidence discussed earlier, AAOS published a recent guideline in August 2021 stating that arthroscopic meniscectomy can be used in degenerative tears in patients who have failed physical therapy [30]. To understand this guideline, we will take a look at the studies upon which it was based. There were only three studies. One of the three was a randomized controlled trial [31]. The authors' conclusion was not in favor of arthroscopic management, yet the guideline used the trial to do so. The guideline group also missed the update on that trial which was published five years later [28]. In that follow up report, the authors followed the patients who had arthroscopic surgery after physical therapy had failed to relieve them-the same group AAOS guideline address- and found that their score was no better than patients who were treated initially with arthroscopy or those who were treated only with physical therapy. The second trial was a comparative study between arthroscopic meniscectomy and physical therapy [28].

The AAOS group used the fact that 30% of the physical therapy only group underwent surgery later to prove their point. Knowing that the primary conclusion of that study was that there is no difference between the two groups, that fact would not be solid enough to recommend surgery. The third and last trial concluded that physical therapy was not inferior to arthroscopic partial meniscectomy and it should serve as an alternative to surgery in patients with non-mechanical symptoms [32]. As mentioned earlier, this conclusion is actually consistent with the latest evidence. To advise our patients with surgery, it has to offer them a solution to their problem rather than being just non inferior to physical therapy. Rather than that, this operation could have serious adverse effects such as accelerated cartilage damage [33]. It is important to know that some patients will continue to have pain in spite of cortisone injection and physical therapy. This would be the expected result of degeneration not a failure of non-surgical treatment that requires recommending a questionable operation that goes against almost all of the available evidence [34]. When treating degenerative meniscal tears, switching from surgical to nonsurgical treatments reduces not only the financial expenditures of unnecessary surgery

but also the postoperative discomfort, psychological stress, and morbidity that patients experience [34].

#### 4.2.2 Subacromial pain syndrome

The Dutch Orthopedic Association developed the multidisciplinary Clinical Practice Guidelines for the diagnosis and management of subacromial pain syndrome (SAPS) in 2012. In summary, it recommended nonoperative treatment for SAPS. SAPS includes conditions with a variety of clinical and/or radiological terms, including bursitis, supraspinatus tendinopathy, partial rotator cuff tears, biceps tendinitis, and tendon cuff degeneration [35]. In this study, the impact of the recommendation's implementation on the number of shoulder operations for SAPS in the Netherlands was assessed. The study concluded that there has been a decline in shoulder operations for associated diagnoses in the Netherlands following the introduction of the multidisciplinary Clinical Practice Guideline "Diagnosis and treatment of subacromial pain syndrome". This guideline's introduction and dissemination appear to have helped reduce unneeded procedures and implement more appropriate medical care [36].

#### 4.3 Arthroplasty

##### 4.3.1 Morbidity and Mortality in Elective Total Knee Arthroplasty Following Surgical Care Improvement Project Guidelines

The major causes of death following noncardiac surgery are perioperative myocardial infarctions and cardiac complications. The Surgical Care Improvement Project (SCIP) created guidelines for administering  $\beta$ -blocker therapy to lessen cardiac problems in an effort to increase patient safety. Before and after SCIP adoption, the incidence of cardiac complications, mortality, and risk variables for cardiac complications were assessed. Mortality due to cardiac causes fell by 50% After the SCIP recommendations were put into place [37].

##### 4.3.2 Regimens for venous thrombosis prophylaxis

Although acetylsalicylic acid (ASA) has been the subject of a sizable amount of research, its effectiveness in comparison to more widely used anticoagulants has been called into question time and time again. However, a trial published in *The New England Journal of Medicine* in 2018 has provided some recent clarity. Patients were randomly assigned to take either aspirin or continue taking the oral rivaroxaban for an additional 9 days after total knee arthroplasty or 30 days after total hip arthroplasty after receiving a 5-day postoperative course of daily rivaroxaban [38]. All patients were monitored for 90 days. According to researchers, vein thrombosis incidence was not significantly different between the groups. The researchers concluded that aspirin is a more practical option for post-surgical prophylaxis than rivaroxaban since it is more accessible and less expensive, with both therapies being nearly equally effective [38].

##### 4.3.3 Reducing blood loss in arthroplasty

Tranexamic acid (TXA) administration is one of the newest and most popular ways to minimize blood loss in order to reduce the risk of blood loss and related problems [39]. TXA considerably reduced perioperative blood loss by 34%, according to a notable systematic review and meta-*Adawy et al., 2023*

analysis of 104 randomized trials on the topic that was published in 2013 in the *British Journal of Surgery*. 33 orthopedic trials with 1881 participants were included in a stratified analysis by type of surgery. This pooled study showed that the use of TXA resulted in a 36% decrease in perioperative blood loss. Another meta-analysis of randomized studies revealed that TXA significantly decreased the requirement for allogeneic transfusions by reducing total (intra- and postoperative) blood loss during hip arthroplasty by 289 milliliters [39]. It is also recommended by AAOS in their guideline published in December 2021, that administration of TXA before surgery would reduce blood loss and transfusion in patients with hip fractures, hip or knee arthroplasty [40,41,42].

## 2. Conclusion

Orthopedic literature is full of various high-quality studies in almost all subspecialties highlighting the value of evidence-based practice in orthopedic surgery. Now we are sure with no doubts that following the evidence will be beneficial for doctors, patients, and policymakers as well. As a nation with a great history in medicine and orthopedics, we should have our own recommendations to follow. As we deal with some different and more aggressive injuries than other developed countries, describing these injuries and how to deal with them will not only be beneficial for our patients and colleagues, but also will enrich the orthopedic literature in general. There is no doubt that our guidelines once developed will be respected and followed by so many orthopedic centers outside Egypt.

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