Pomeranian J Life Sci 2025;71(1):7-12 doi: 10.21164/pomjlifesci.1036

An analysis of hand surgeons' motivations for making therapeutic choices in light of their consistency with evidence-based medicine and current medical knowledge

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ABSTRACT

The diagnosis and treatment of diseases and injuries should be based on rational grounds and be consistent with current medical knowledge. Decisions made in accordance with established and generally accepted standards (the so-called "evidence-based medicine") at least in principle ensure an optimal level of medical practice. Decisions about the choice of a particular treatment method are usually based on the knowledge acquired during specialization in a given medical discipline (the so-called "current medical knowledge"). The objective of this study was to attempt to analyze hand surgeons' motivations for making therapeutic choices, assuming that each of these decisions should be consistent with evidence-based medicine and current medical knowledge, as well as rational and beneficial for the patient. Reasons for decision-making in 2 injuries commonly seen in hand surgical practice and 1 that is uncommon but stressful and requires urgent action are presented. It was shown that when deciding on the choice of treatment, the surgeon is guided by various considerations, which are discussed in detail in this article.

Keywords: decision-making in hand surgery; evidence-based medicine; treatment guidelines; distal radial fractures treatment; scaphoid fracture treatment.

INTRODUCTION

The diagnosis and treatment of diseases and injuries should be based on rational grounds and be consistent with current medical knowledge (CMK). Decisions made in accordance with established and generally accepted standards, at least in principle, ensure an optimal level of medical practice, lead to predictable and knowledge-consistent treatment outcomes, and protect the physician from accusations of incompetence in the event of therapy failure. The standards of diagnosis and treatment are based on the so-called "evidence-based medicine" (EBM).

Evidence-based medicine is a continuously updated medical practice that emphasizes the practical application of the best available current research findings. Knowledge updates are based on the results of evidence-based studies (prospective, randomized, conducted on a sufficiently large sample size, and reliably interpreted), both clinical and experimental. In this process, meta-analyses and systematic reviews of the literature are particularly useful, as they analyze (according to set criteria) the results of published research in a specific field of medicine and formulate conclusions that serve as the foundation for recognized diagnostic and therapeutic paradigms [1, 2, 3, 4].

In practice, decisions regarding the choice of a particular treatment method are usually based on the knowledge acquired during specialization in a given medical discipline, referred to as CMK at the national or institutional level. Current medical knowledge is a periodically updated set of principles for the diagnosis and treatment of specific diseases and injuries, based on the specialization program in a particular medical discipline. This set of principles is created by a team of experienced specialists, reviewed, and approved by the national consultant-in-chief of the respective medical specialty. The essential knowledge that forms the basis of the specialization program is typically contained in textbooks designated by the consultant-in-chief as required reading for the specialization exam [1, 2, 3, 4]. It should be emphasized that these 2 concepts (EBM and CMK) are not identical.

In many specific clinical situations, EBM does not provide clear therapeutic recommendations, and the surgeon must use common sense when making a decision. In some cases, EBM provides precise recommendations, but they are not applied in practice due to other circumstances, such as the surgeon's fear of being accused of malpractice in the event of treatment failure. A typical example of this is the use of antibiotics in hand surgery. There are no clearly defined guidelines from hand surgical societies regarding preoperative antibiotic prophylaxis [4]. Many hand surgeons continue to routinely use preoperative prophylaxis despite limited supporting evidence.

The study by Dunn et al. shows that nearly a quarter of surgeons administer prophylaxis when it is likely not indicated. The majority (74%) are aware of the lack of evidence supporting this practice but make these choices based on medical-legal concerns. In addition, many report that antibiotics are given without their consent due to hospital policy, believe that the current evidence is insufficient, or simply follow the practice because they assume other surgeons also use unnecessary prophylaxis [4]. Similar situations occur in other medical disciplines [1, 2, 3].

The objective of this study was to analyze hand surgeons' motivations for making therapeutic choices, assuming that each of these decisions should be consistent with EBM, CMK, rational, and beneficial for the patient.

PREMISES FOR MAKING A DECISION

When deciding on a treatment approach, the surgeon (although this applies to all doctors) is guided by various considerations. The most common basis for making a choice is common sense and compliance with CMK:

1. "I will choose the treatment that I know best, have experience in, believe will be best for the patient, and that is also consistent with CMK".

Another motivation is compliance with EBM:

2. "I will choose the treatment method that, according to the data from the literature, will yield the best results (will be beneficial for the patient)". However, in such cases, the preferred treatment option may not necessarily be available or known to the doctor. As a result, the patient may be referred to another (reference) center with more experience in treating this particular injury.

Other motivations are also possible:

3. "I will choose this treatment method because it is economically beneficial (for the department I run or for the hospital)".
4. "I will choose this treatment method to gain more experience (I have limited experience, and this is an opportunity to practice)".
5. "I will do what I can at the moment (which may not be consistent with either CMK or EBM)". Such a motivation is, of course, an expression of the surgeon's helplessness. Under stress, the decision may not be optimal. In such situations, common sense should prevail to ensure that a minimalist approach does not eliminate the possibility of using the optimal treatment method in the future.

In the next section of the article, examples of such decisions and the reasons behind them will be presented.

SIMPLE DISTAL RADIAL FRACTURE (DISPLACED, BUT STABLE AND IN PATIENT WITH GOOD BONE QUALITY)

Simple distal radial fracture (displaced, but stable and in patient with good bone quality) – Figure 1 – can be treated either conservatively or surgically. Both EBM and CMK do not provide clear recommendations on how to proceed in such cases [5, 6, 7, 8]. Therefore, the reasons for choosing a particular treatment method are as follows:

1. reasons for the decision on conservative treatment (closed reduction and immobilization):
   - "I will do what I know how to do and what I can do at the moment",
   - "I will do what I think will be good for the patient",
   - "I will do what is essentially consistent with CMK and EBM";
2. reasons for the decision on operative treatment by percutaneous fixation with K-wires:
   - "I will do what I know how to do and what I can do at the moment",
   - "I will do what I think is better for the patient than conservative treatment",
   - "I will do what is essentially consistent with CMK and EBM",
   - "I will do what is economically beneficial for the hospital (reimbursement from the National Health Fund is greater than the total costs of care)";
3. reasons for the decision on surgical treatment by open reduction and internal fixation with a plate:
   - "I will do what I know how to do, what I can do at the moment, and what I think will be best for the patient",
   - "I will do it to learn it (I have little experience, but this is an opportunity to gain more practice)",
   - "I will do it because it is beneficial for me (I have an informal 'arrangement' with the company manufacturing implants and can expect benefits, such as funding for a national or international conference)",
   - "I will do something that is not economically beneficial for the hospital (total costs of care are greater than the reimbursement from the National Health Fund)".

Final decision: closed reduction, percutaneous fixation with K-wires (Fig. 2).

FIGURE 1. X-ray of a simple distal radial fracture

MORE COMPLEX, COMMINUTED DISTAL RADIAL FRACTURE (DISPLACED, UNSTABLE)

More complex, comminuted distal radial fracture (displaced, unstable) is presented in Figure 3. Recommendations from EBM: conservative treatment and percutaneous K-wire fixation do not provide optimal conditions for reduction and its maintenance (stability). Scientific evidence indicates that open reduction and internal fixation with a plate provide better conditions for bone union in the correct position and, in the long term, lead to better hand function [5, 6, 7, 8]. Current medical knowledge does not provide clear recommendations on how to proceed in such cases. The reasons for choosing a particular treatment method are as follows:

1. reasons for the decision on conservative treatment (reduction and immobilization):
   — "I will do what I know how to do and what I can do at the moment, even though it is not consistent with EBM and will probably not be beneficial for the patient";
2. reasons for the decision on operative treatment by percutaneous fixation with K-wires:
   — "I will do what I know how to do and what I can do at the moment and what, in my opinion, is better for the patient than conservative treatment, even though it is not in line with EBM and is not optimal for the patient",
   — "I will do what is economically beneficial for the hospital (reimbursement from the National Health Fund is greater than the total costs of care), even though it will not be optimal for the patient";
3. grounds for the decision on surgical treatment by open reduction and internal fixation with a plate:
   — "I will do what I know how to do and what I can do at the moment, what is consistent with EBM recommendations, and what will be optimal for the patient",
   — "I will perform an operation that is not economically beneficial for the hospital (total costs of care are greater than the reimbursement from the National Health Fund) but is optimal for the patient",
   — "If I cannot perform this operation (due to limited experience), I will refer the patient to a reference center (there is no urgency to perform this operation immediately)".

Final decision: operation – open reduction and internal fixation with a plate (Fig. 4).

NON-DISPLACED FRACTURE OF THE WAIST OF THE SCAPHOID BONE

Non-displaced fracture of the waist of the scaphoid bone is presented in Figure 5. Recommendations from EBM: conservative treatment (immobilization in a "ball glove" plaster cast for 6–8 weeks) yields good results, although the rate of nonunion is relatively high – approx. 20%.

Surgical treatment with fracture fixation using a headless compression screw (HCS) significantly reduces the risk of nonunion but may be associated with complications, such as limited wrist mobility [9, 10, 11]. This procedure is relatively difficult, and correct implant placement in the scaphoid requires experience. The reasons for choosing a particular treatment method are as follows:

1. grounds for the decision on conservative treatment:
   — "I will do what I believe will be beneficial for the patient and what is consistent with EBM, although it carries a relatively high risk of scaphoid bone nonunion";
2. grounds for the decision on operative treatment – fixation of the scaphoid fracture with a screw:
   — "I will do what, according to EBM, is not necessarily better for the patient than conservative treatment but still reduces the risk of nonunion, which could become a problem for the patient in the future",

FIGURE 2. The fracture from Figure 1, neatly fixed with K-wires

FIGURE 3. A more complex distal radial fracture

FIGURE 4. The fracture from Figure 3, excellently fixed with the titanium palmar plate

— "I will perform this procedure to gain experience (scaphoid fractures are uncommon, and to learn how to operate on them, every case must be utilized as a learning opportunity)",
— "If I do not have enough experience with this procedure, I will refer the patient to a higher-reference center (as with distal radial fractures, there is no urgency to perform this operation immediately)".

Final decision: operation – fixation of the scaphoid fracture with the HCS (Fig. 6).

DISPLACED FRACTURE OF THE WAIST OF THE SCAPHOID BONE

Displaced fracture of the waist of the scaphoid bone is presented in Figure 7. Recommendations from EBM and CMK: conservative treatment is associated with a high risk of nonunion. Surgical treatment involving fracture reduction and fixation with a HCS is the optimal approach for the patient [9, 10, 11]. The reasons for choosing a particular treatment method are as follows:

1. reasons for the decision on conservative treatment:
   — "I will do what I know how to do, even though it is not consistent with EBM and will not be beneficial to the patient";
2. reasons for the decision on operative treatment with the HCS:
   — "I will choose the option that, according to EBM, is better for the patient than conservative treatment",
   — "I will also perform this procedure because I want to gain experience in this technique",
   — "if I do not have enough experience with this operation, I will refer the patient to a reference center".

Final decision: operation – fixation of the scaphoid fracture with the HCS (Fig. 8).

HAND AMPUTATION (CLEAN-CUT INJURY)

Hand amputation (clean-cut injury) is presented in Figure 9. Recommendations from EBM: hand replantation is the best option, allowing for the recovery of the body image and hand function [12, 13, 14]. The reasons for choosing a particular treatment method are as follows:

1. reasons for the decision on surgical treatment – hand replantation:
   — "I will do what I believe, in accordance with EBM and CMK, will be best for the patient",
   — "if these surgeries are not performed in my department, I will transfer the patient to a Replantation Centre".

Final decision: transfer of the patient (and amputated hand) to the Replantation Centre for replantation (Fig. 10 and 11).

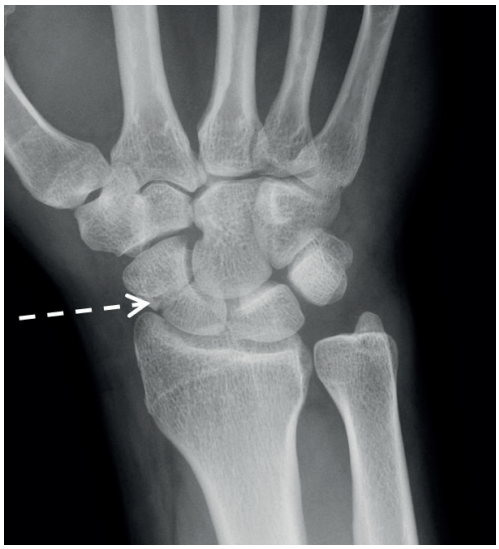

FIGURE 5. Non-displaced fracture of the waist of the scaphoid bone (marked with an arrow)

FIGURE 6. The fracture from Figure 5, fixed with an headless compression screw

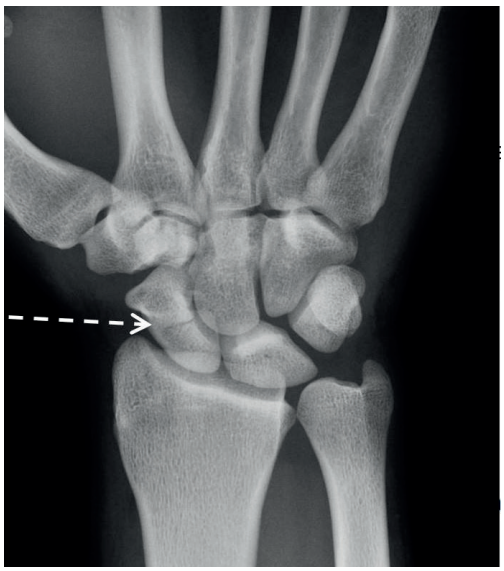

FIGURE 7. Displaced fracture of the waist of the scaphoid bone (marked with an arrow)

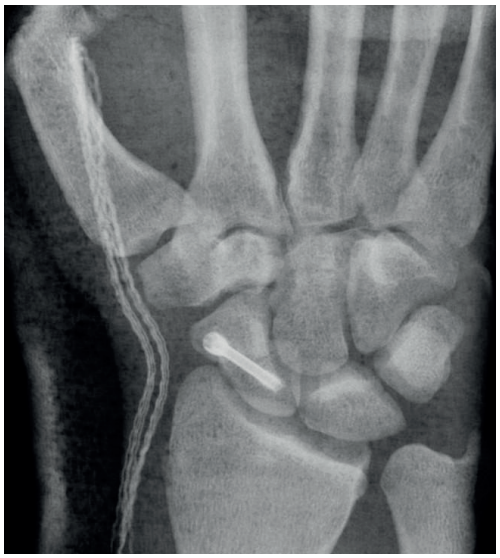

FIGURE 8. The fracture from Figure 7, fixed with a headless compression screw

FIGURE 9. Clear-cut amputation of the hand

FIGURE 10. Six-month post-replantation result of the hand from Figure 9

FIGURE 11. Six-month post-replantation result of the hand from Figure 9

HAND AMPUTATION (AVULSION OF CRUSH INJURY)

Hand amputation (avulsion of crush injury) is presented in Figures 12 and 13. Recommendations from EBM: the chances of successful replantation and functional recovery of the hand are minimal, although in some cases, not entirely zero [12, 15]. The optimal solution is surgical closure of the hand stump. The reasons for choosing a particular treatment method are as follows:

1. reasons for the decision on surgical treatment – surgical closure of the hand stump:
   - "I will choose the option that aligns with EBM and is most beneficial for the patient, even though they will be permanently disabled",
   - "I will perform the procedure in my department";
2. reasons for the decision to transfer the patient to the Replantation Centre:
   - "I am not convinced that canceling replantation is the best option for the patient, and there is also pressure from the patient and their family",
   - "therefore, I will make every effort to transfer the patient to the Replantation Centre, where a final and optimal decision will be made".

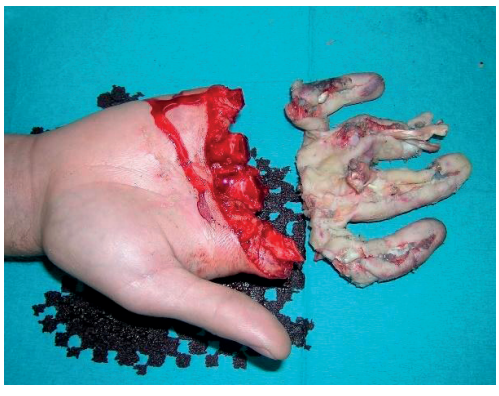

FIGURE 12. Crush amputation of the fingers and distal metacarpus caused by a power-press

FIGURE 13. Avulsion amputation of the fingers and distal metacarpus caused by an industrial machine

The first option requires experience with contemporary limb replantation techniques. In Poland, since 2009, the Replantation Service has provided significant support in such cases [13]. Each day, a different unit is on call for hand amputations at the metacarpal level, thumb amputations, and multidigit amputations from across the country. The service also covers certain cases of crush and degloving injuries that require a microsurgical facility.

Amputation cases are submitted to the on-call unit by telephone. A photograph of the amputated part and the stump must be sent via MMS (X-rays are recommended in cases of crush injuries). A brief interview is conducted with the physician submitting the case to gather details on the circumstances and timing of the injury, as well as the condition of the amputated part and the patient. After analyzing the received images, a decision is made to either accept or refuse the case. If accepted, the unit managing the patient arranges transportation, most often by plane or helicopter.

This organizational structure of the Replantation Service, where the decision to accept or refuse a referred case is at the discretion of the on-call doctor at the Replantation Centre, partially relieves the submitting physician of the responsibility for making an irrational decision.

In the case shown in Figure 12, the chance of successful replantation is zero, as the fingers and distal part of the metacarpus are completely crushed. In contrast, in the avulsion, trans-metacarpal amputation shown in Figure 13, there is a minimal chance of successful replantation, which could be attempted at the Replantation Centre. However, in almost all such cases, the Replantation Centre ultimately decides to cancel the referral. This decision is based on the extensive experience of these centers, which indicate that 80–90% of such procedures fail. Even in cases where replantation is technically successful, the functional outcome is usually poor, making the replanted hand more of a burden than a benefit to the patient [15].

The decision to refuse cases like those in Figures 12 and 13 is therefore well-justified. Additional advantages include avoiding the unnecessary use of medical air transport, preventing the engagement of the medical team from the Replantation Centre, and sparing the patient from the risks associated with prolonged air transportation.

This article presents several examples of the factors influencing a surgeon's therapeutic decisions and the motivations behind them. Each decision should be optimal for treating a specific injury or condition and provide the greatest benefit to the patient. While EBM and CMK form the foundation for making optimal decisions, their application is not always straightforward.

Other factors may also influence decision-making, including medico-legal considerations, financial aspects, or the desire to gain experience in a particular procedure. However, it is always preferable that these decisions align as closely as possible with EBM and CMK.

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