

# Clinical decision-making for shoulder surgery referral: an art or a science?

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## Abstract

Decision-making in musculoskeletal health care is complex, with discrepancy among clinical providers, and variation in the per cent of referrals for specialist care. To date there is an increased focus on specialist referrals, risking overuse of expensive testing and contributing to unnecessary treatment. This report will consider the difficulties of primary care musculoskeletal decision-making using shoulder injuries as an example, presenting a solution based on multi-criteria decision-making analysis with online software. The associated issues involved in clinical decision-making are complex. Contributing to the components of complexity are; the aetiology of shoulders being multi-faceted, the experience and knowledge of providers, and the burden of patient demands. Notwithstanding, funding considerations, resource allocation availability, and other associated issues around clinical decision-making. Considering there are many facets involved in decision-making, this is an area where multi-criteria decision-making analysis (MCDM) may be appropriate. MCDM which uses mathematical analysis, is increasingly being used in health care and could be applied to the challenges of musculoskeletal care. MCDM has the potential to decrease variability in decision-making and be used as a tool to augment clinical decisions. Furthermore, the key clinical factors that decision-making is based on are to date unclear, therefore, this preliminary report offers a start towards moving to a clarification of the key factors, and an approach for implementing improved shoulder clinical care decision-making which could then be adapted and applied to other body sites.

Decision-making in musculoskeletal health care is a complex process, and therefore disagreement concerning the ideal treatment pathway is not unexpected.<sup>1</sup> Clinicians striving to provide evidence-based patient care have multiple subjective factors to consider, and these multiple factors complicate decision-making. To date, there has been a focus on specialist referral for musculoskeletal injuries, including shoulder lesions, leading to expensive testing and – potentially – unnecessary treatment.<sup>2-4</sup> Decision-making for shoulder treatment pathways has received little attention in the literature, and the key clinical factors on which decision-making is based remain unclear. This report will consider the difficulties associated with musculoskeletal decision-making and present a possible solution to improve clinical decisions based on *multi-criteria decision-making*, using shoulder injuries as a model.

## Difficulties associated with musculoskeletal decision-making

Currently, clinical decision-making is predominantly idiosyncratic, with the risk of unnecessary imaging and overuse of surgical funding. In New Zealand (NZ), elective surgeries have increased by around 30% from 2010-2015.<sup>5</sup> This situation is not unique to NZ: the overuse of expensive musculoskeletal tests and treatments is considered a common problem.<sup>2,3,6</sup> Factors which have been identified as contributing to the problems of increasing numbers of patient referrals include clinicians with less experience, and clinicians working in isolation.<sup>4</sup>

The challenges in primary care are significant, with clinicians having limited time for decision-making and

patient information being complex to synthesise. Additionally, processing information is complicated by styles of communication, patients being unable to accurately recall pertinent information, and providers misinterpreting the information. Decision-making in musculoskeletal conditions is based upon a mix of hypothetico-deductive reasoning and pattern recognition, regardless of whether the decision-maker is a novice or an expert.<sup>7</sup> Irrespective of whether a novice or expert; this leads to decision-making variability.

Clinical guidelines have been developed as an important tool to enhance decision-making; however, these are often divisive. Guideline use can be hindered for several reasons, including lack of awareness, clinical knowledge beliefs, and additionally by not being up to date. Updating a guideline requires considerable expertise<sup>8</sup> and unless regularly updated the guideline becomes redundant. Guidelines have their place, however, they are not all-inclusive.

Other factors affecting decision-making include both the significant influences of the patient and the health provider, with each having their perspective and beliefs on the benefits of prospective treatment pathways. This introduces decision-making bias: for example, the patient may be fixed on one solution, such as imaging, and may compel the health provider to feel obliged to refer for imaging.

Nonetheless, hypothetico-deductive reasoning, intuition, and the use of clinical guidelines do not enable consistent transparent decision-making as evidenced by the increasing numbers of imaging requests and surgery,<sup>3,9</sup> despite the apparent effectiveness of conservative rehabilitation.<sup>10-12</sup> Regardless of the clinical pathway, it is recognised that clinical outcomes can be variable. A recent study found little difference between operative and non-operative treatment groups for full-thickness tears of the rotator cuff, using the quality-of-life index score. At 5 years post enrolment in the study, 75% of participants responded to conservative treatment and remained successfully treated.<sup>10</sup>

### **Multi-criteria decision-making**

Given such challenges, other options to enhance clinical decision-making have been proposed. One option is multi-criteria decision-making (MCDM) analysis,<sup>13-15</sup> which could potentially be used to improve consistency, reliability, and the efficiency of clinical decision-making in an evidence-based method.

MCDM analysis can be a means to quantify clinical subjective information and formalise decision-making. When clinically interpreting multiple pieces of subjective information, this information can become more explicit and transparent if structured into an ordered form using decision-making tools. MCDM analysis has the additional benefit of using mathematical modelling with ranking and scoring, to refine and provide decision-making structure. Having structure and ranking of important clinical information supports the clinician with decision-making which is a step up from (potentially flawed) clinical intuition.<sup>16</sup>

The design of a model is beyond the scope of this report. However, we can briefly consider the steps using the example of a clinical provider undertaking decision-making from a musculoskeletal assessment. When mathematical modelling is added to this scenario, as in MCDM analysis, multiple subjective pieces of clinical information can be developed into a set of decision-making factors called criteria, which in turn have levels of choices. The levels of choices have a point value, that can represent their relative importance,<sup>13</sup> and there is available software that can be used to attribute point values to the refined clinical information.<sup>17</sup> The point values give a clear representation of the relative importance of each piece of clinical information to allow alternatives to be compared.<sup>18</sup> This allows transparency, reliability, and credibility for the decision-making process. While there are many different MCDM models, they all aim is to improve decision-making.<sup>19</sup> Although, to date, MCDM is not being used for shoulder injury pathway decision-making, there are many areas in healthcare where MCDM has been used successfully, such as prioritising antibiotics, recommending hip tests and classifying disease.<sup>20-22</sup>

When considering the basic MCDM, and what makes this a possible solution, it is helpful to have some history. MCDM has been developing for over 40 years<sup>23</sup> and for health care, the use of MCDM analysis is steadily growing.<sup>15</sup> It is important to recognise that in health care, algorithms and point systems have long been used as a source of assisting decision-making and there is increasing support for algorithms for more

complex decisions, such as prioritising for elective surgery<sup>13</sup> With an increasing prevalence of musculoskeletal conditions as the population ages, this is an area where MCDM tools can be useful to guide decision-making.<sup>24</sup> MCDM tools are used online, and the process of using internet-based software for health decision-making has been found acceptable for both health care providers and patients.<sup>13</sup> Furthermore, online MCDM software is a step forward from the earlier mentioned points-based systems.

## Shoulder injuries

A model where MCDM analysis could be applied to illustrate the benefit is shoulder soft tissue injuries and lesions, which are prevalent and costly.<sup>12,25-28</sup> Treatment may consist of physiotherapy, (including manual therapy and exercise), medication, and for more serious conditions, surgery. Given that the healing of chronic shoulder problems often seems slow, surgery offers patients a more immediate solution; however, this is not always the most efficacious option. Currently, shoulder health care, including outcome reporting, is highly variable.<sup>29</sup> Perhaps most importantly, for clinicians providing such primary health care, judging the appropriate circumstance and timeframe for imaging and/or surgery is challenging.

When considering shoulder injury treatment pathways, the shoulder presents some specific challenges. Shoulder pain can be persistent and reoccurring: while prevalence reporting is variable, 20-50% of shoulder presentations were found to be still experiencing pain twelve months after the initial complaint.<sup>26,30,31</sup> Furthermore, the aetiology of shoulder injuries is complex which can sometimes lead to contradictory clinical opinions. Considering rotator cuff tears, as one of the most common shoulder injuries, it is known that rotator cuff tears may develop without injury and can be asymptomatic.<sup>32</sup> Therefore, in a health care system with injury based funding, as in NZ, pre-existing tendon tears complicate the decision-making for funders. Beyond initial diagnosis and categorising, the treatment pathway decision-making process is also complicated by multifactorial clinical criteria, health systems, and funding. The goal of making the best judgment for the patient is not an easy one, and interpreting clinical information can vary among clinicians.<sup>33</sup>

Accordingly, with the ready availability of imaging as an early decision-making tool, imaging for shoulder conditions is overused.<sup>3</sup> Ideally, the role of imaging is in identifying pathology that will change the treatment pathway and detect red flags. Although making a decision is a tangible challenge, gathering more information in the form of imaging does not necessarily contribute towards better management of the typical rehabilitation patient. An identified small soft tissue injury does not always necessitate a change of care pathway nor surgery. It is known that a small tear caused by injury can heal,<sup>34</sup> and a small pathological tear with no injury can progress to a full tear that will not heal.<sup>35</sup> Furthermore, the shoulder can function well with a full tear<sup>10</sup> and shoulder pathology can be present in both symptomatic and asymptomatic shoulders.<sup>36</sup>

Decision-making for musculoskeletal shoulder injuries/conditions are not based on a single factor, and each factor in the process carries a level of importance; understanding the weighting of each key factor is a step towards a better understanding of the decision-making process. Potentially, shoulder injury decision-making is an area where MCDM analysis could be used to support both the novice and expert practitioner alike.

## Conclusion and potential areas for development

Given the recognised complexity in decision-making for shoulder conditions, using a MCDM tool offers the potential to support and simplify this complexity, adding consistency and easing the burden in decision-making. Furthermore, MCDM tools can lessen the gap between novice and expert practitioner, while dispelling the uncertainty of which clinical factor is more important. Likewise, the development of a musculoskeletal MCDM tool for shoulder injuries can potentially be adapted and applied to other body sites.

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## CONFLICT OF INTEREST

The authors have no conflict of interest.

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