CLINICIAN DECISION AID FOR PATIENTS WITH HIP FRACTURES

By

Daniel Li, MBBS

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CERTIFICATE OF APPROVAL

This is to certify that the Master's Capstone Project of

Daniel Li

"*Clinician decision aid for patients with hip fractures*"

has been approved

Karen B. Eden, PhD

Capstone Advisor

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ABSTRACT

The rate of hip fractures has been steadily increasing over the past 3 decades, 5 fold in women and 1.5 times in men. For patients with hip fractures, there are a number of treatment options available, varying from surgery to conservative management. Each option has benefits and risks, depending on patient factors. Advice to patients about treatment options is often given by junior doctors who learn by observation and mentoring by their senior colleagues. The advice given may therefore not be standardized or evidence-based and patients may make misinformed decisions. Decision aids, developed to support and streamline the medical decision-making process, may play a part in decision-making for patients with hip fractures. A decision aid was created for providers to use in consultation with patients who have hip fractures. This website included an evidence-based pathway, treatment options and advice on treatment. Ten clinicians used the pathway and answered a questionnaire on ease of use, clinical accuracy, and usability. Overall, the clinicians thought the pathway was clinically accurate but wanted more customization for individual patient concerns and expectations. This study provides preliminary evidence that decision aids can prove beneficial for orthopedic practice.

INTRODUCTION

Prevalence of hip fractures

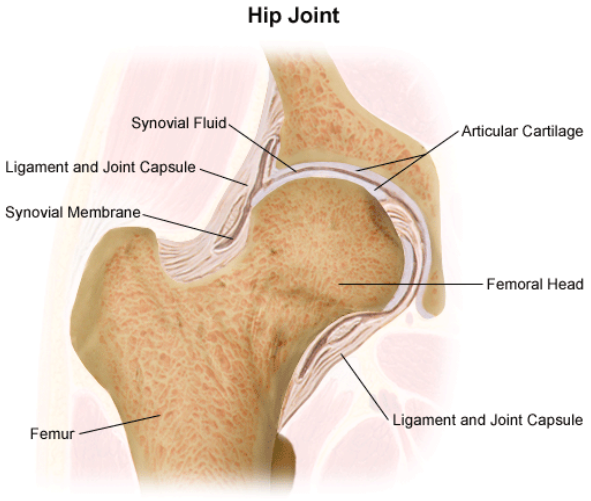

Figure 1: Anatomy of a hip joint

Approximately 1.6 million hip fractures occur worldwide each year and by 2050, this number could reach between 4.5 million[1] and 6.3 million.[2] Over the past three decades in Singapore, hip fractures in women aged 50 and above have increased five-fold from 75 cases to 402 cases per 100,000. Among men aged 50 and older, the increase was 1.5 times over the same period; from 103 cases to 152 cases per 100,000.[3]

The contributing factors for the increasing trend in rate of hip fractures could be due to aging population, increasingly sedentary lifestyle (lack of exercise) of the population as a whole and inadequate dietary calcium and vitamin D intake.[3]

These fractures lead to loss of function and disability and have great impact on both patients and their family. A recent local study showed that about one in five persons died within a year of sustaining an osteoporotic hip fracture and one in three became wheelchair bound or bedridden.[3]

Types of hip fractures and treatment options

There are three common types of hip fractures (see Figure 2). Most hip fractures occur at or near the head of the femur.

Treatment usually consists of surgery which relieves pain and restores function. There are occasions where surgery is not done, for example, patients who were permanently unable to walk before the fracture and who have multiple co-morbidities with a high risk of peri-operative death.

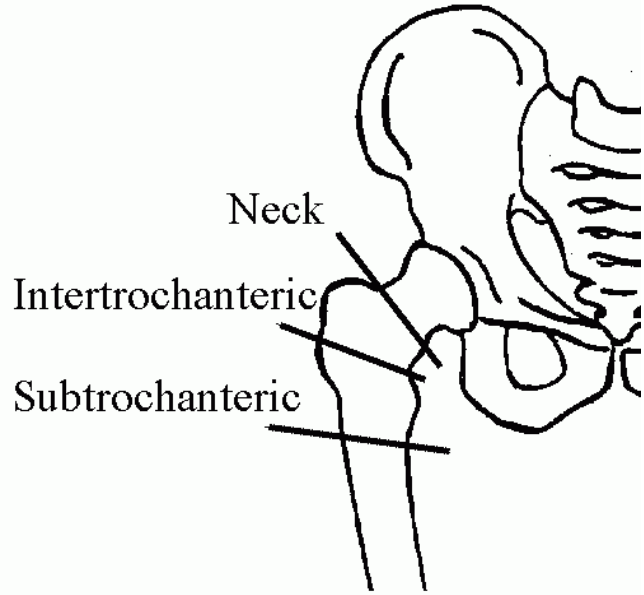

Figure 2: Types of hip fractures

The type of surgery depends on the type and severity of the fracture and on the patient's level of activity.

Treatment of femoral neck fractures

The family physician often plays an important role in assessing the patient's pre-injury level of function and co-morbidities to help determine appropriate goals for treatment. Ambulatory patients should be treated aggressively, typically with surgical intervention, with the goal of restoring their pre-injury level of activity as quickly as possible. Debate continues among surgeons as to whether open reduction with internal fixation (ORIF) or arthroplasty is the best treatment for appropriate surgical candidates. Non-operative management is generally reserved for debilitated patients but may be reasonable in patients with stable, impacted fractures

Treatment of intertrochanteric fractures

In consultation with the orthopedic surgeon, the family physician should assess the patient's ambulation, overall functional status, and medical co-morbidities and

then determine the appropriate definitive management. Ambulatory patients should be treated aggressively, typically with surgical intervention, with the goal of restoring their pre-injury level of activity as quickly as possible. Non-operative management with good pain control may be the best approach for the non-ambulatory patient.

Treatment of trochanteric fractures

Most trochanteric fractures heal well with non-operative management, unless significant displacement (>1 cm) is present. The patient generally must remain non-weight bearing for three to four weeks. Many patients are able to return to full activity as soon as two to three months following the injury. Displaced fractures should be referred to an orthopedic surgeon for possible ORIF.

Advice on the above treatment options available is often given by junior clinicians in the wards who learn by observation and mentoring by their senior colleagues. This advice may not be standardized across the department. These junior clinicians are often uncertain what to do themselves and when to call on their superiors for advice.[4] Additionally, patients may make misinformed decisions with without understanding medico-legal implications. Surgical delay independently affects mortality. Patients for whom surgery is delayed for 2 days or more have a 17% higher mortality rate at 1 month.[5]

Shared decision making

Decision-making for surgeries and other medical interventions have evolved over the past several decades. There has been a shift from a paternalistic model of decision-making to a shared or consumerist model, in which patients are active participants of care.[6-8] Consistently across many countries, over 60% of patients want to take an active role in making their risk-related ("close-call") health decisions (see Figure 3).[9] This rise in patient participation in health decisions is being driven by enhanced accessibility to health information, informed consent legislation, clinical practice guidelines identifying decisions that require consideration of patient values, and cultural shifts with less deference to authority figures.[10]

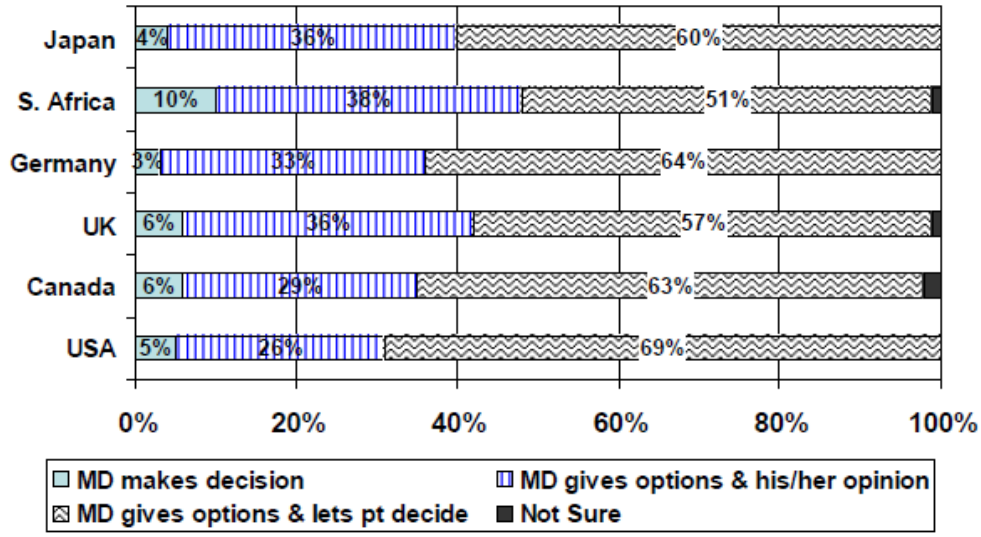

Figure 3: Public's view on who should be mainly responsible for risk-related health decisions.[9]

One study revealed that clinicians are poor judges of patients' values and that patients often have unrealistic expectations of treatment benefits and harms.[9] Therefore, two types of experts are needed to judge options: clinicians to provide technical information on options, outcomes and probabilities, and patients to judge the value of good and bad outcomes.

The approach taken to discuss and reach agreement on options has been labeled “shared decision-making” or “evidence-informed choice”. To streamline the process, evidence-based patient decision aids have been developed as adjuncts to consultation to prepare people to participate in decision-making.[11-14]

Decision aids in orthopedic surgery

Clinical decision aids have proven to reduce the need for unnecessary interventions[3], increase the accuracy of diagnoses and improve clinical outcomes.[24] However, there is little evidence in the medical literature relating to shared decision-making in orthopedic surgery[15] despite the increased emphasis on patient involvement in decision-making.

Differences in gender, beliefs, and values appear to influence patients’ decision-making about joint replacement surgery. This evidence supports the argument that, in general, patients’ orthopedic knowledge and attitudes should be taken into account, and, in particular, decision aids should be designed to take these individual factors into consideration.[15]

Many decision aids have been developed for osteoporosis, a known risk factor for fractures but not specifically for patients with hip fractures. Consultant orthopedic surgeons are generally positive about the use of decision aids for total joint replacement surgery. The challenge is then to produce a decision aid that meets appropriate quality standards, works for this particular group of providers and patients[15] and achieves the aim of standardizing information and advice given to patients.

MATERIALS AND METHODS

Establishing an evidence-based pathway

A MEDLINE search was done with the terms ‘treatment’ and ‘hip fractures’ with the objective of formulating a set of criteria to make a decision between operative or non-operative management. A number of recurring themes relating to the patient was identified. They were:

1. Ambulatory status of patient,
2. Age and displacement of fractures,
3. Presence of major uncorrectable co-morbid disease (e.g. chronic renal failure), and
4. End stage of terminal disease (e.g. cancer). [16-22]

These conditions formed the first decision factor.

The search was then further refined with the terms ‘femoral’, ‘intertrochanteric’ and ‘trochanteric’ to determine appropriate management recommendations for the various types of fractures. These formed the basis of the second decision factor.

The above findings were finally integrated into a pathway as shown.

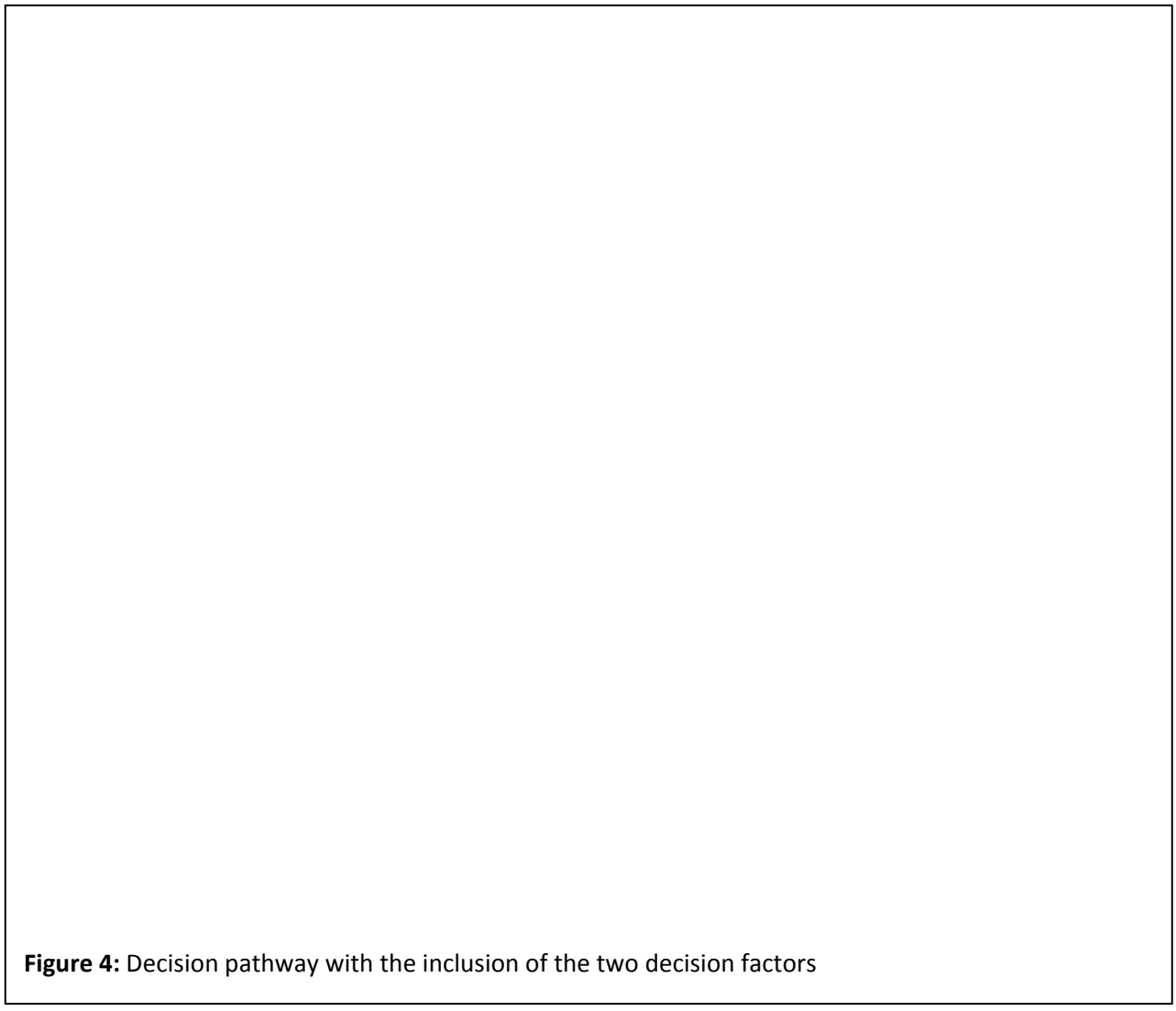

Figure 4: Decision pathway with the inclusion of the two decision factors

Design of decision aid

A website (http://www.dahipfractures.webs.com/) incorporating the above pathway was created. The webpages were written in HTML language, uploaded and hosted on a free web server. The web server was also commercial-free and available for use 24 hours a day on any workstation or mobile device linked to the Internet. It was designed for use by providers as they consulted with patients with hip fractures.

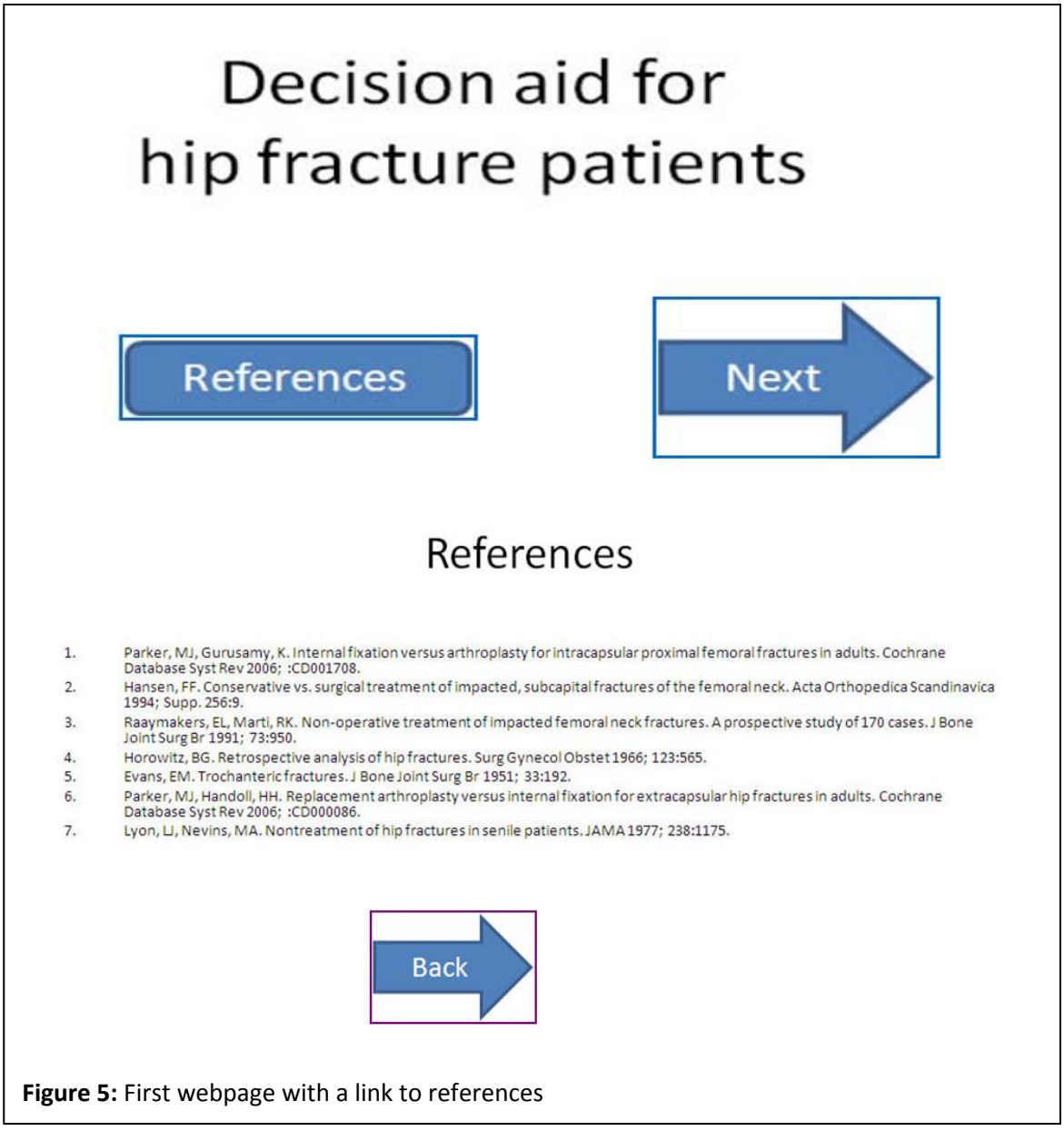

Figure 5: First webpage with a link to references

The first webpage had a link to the relevant references.

Upon starting the decision aid, the first decision factor, patient's medical condition, was displayed requiring a response from the user.

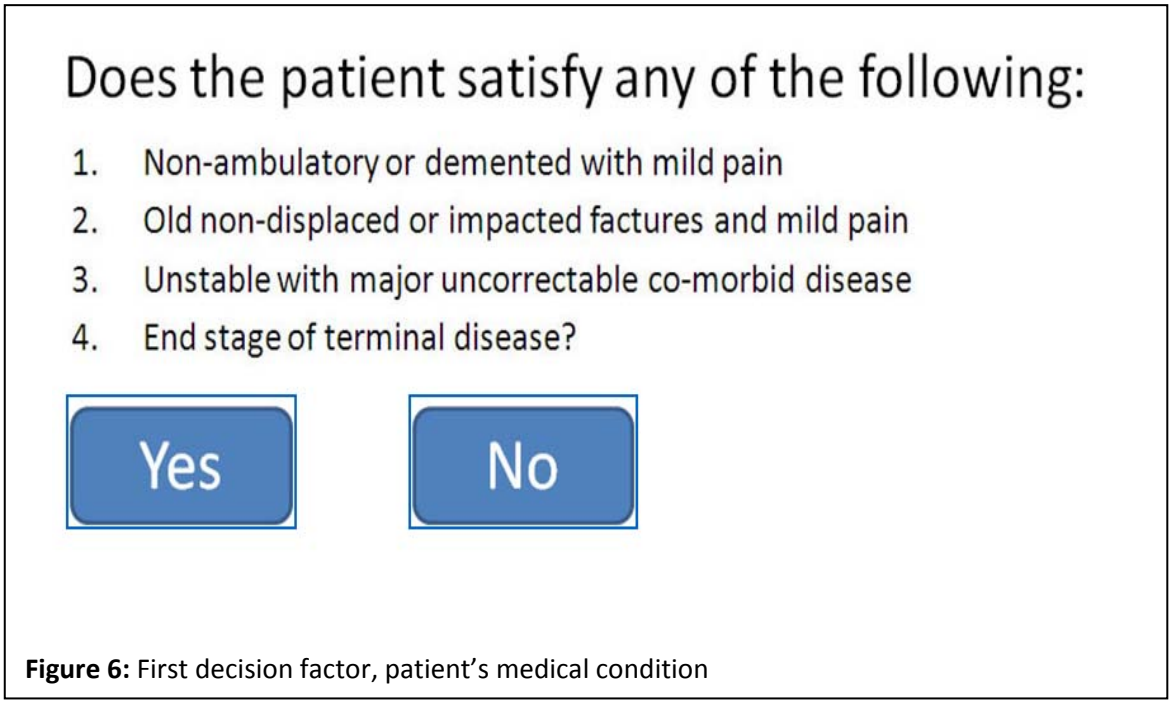

Figure 6: First decision factor, patient's medical condition

A non-operative management was recommended if the patient satisfied any of the listed criteria. A button would then be displayed to allow the user to restart the decision aid.

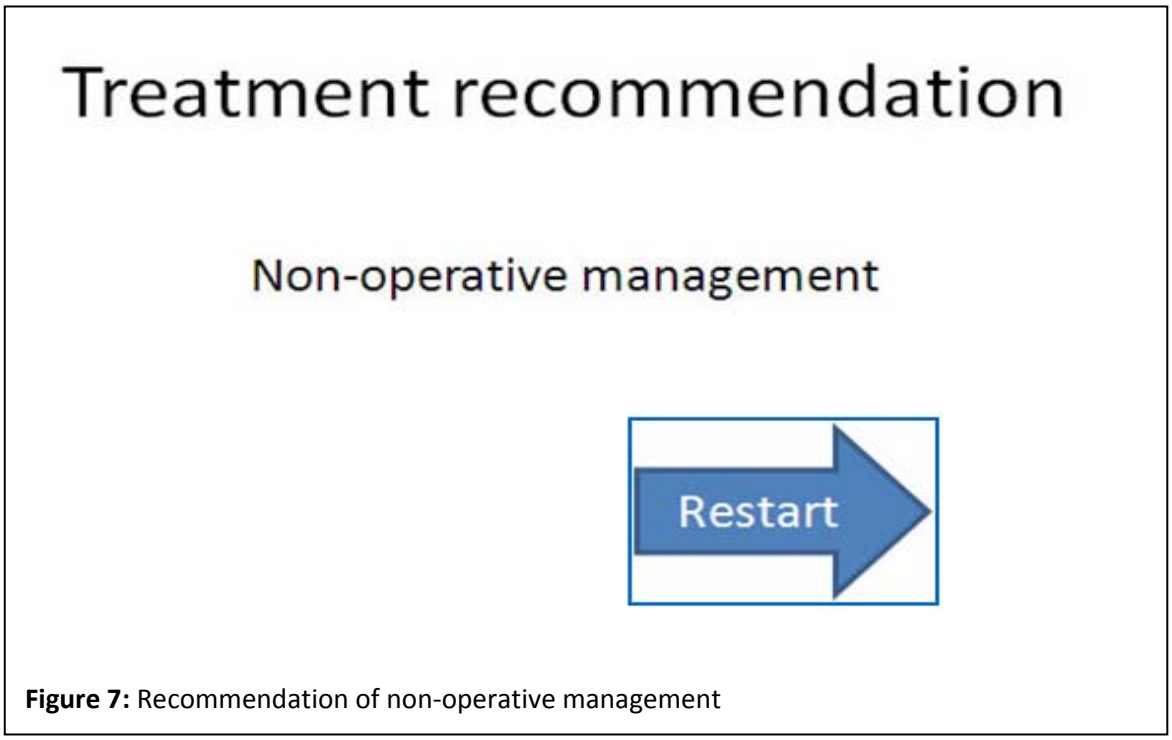

Figure 7: Recommendation of non-operative management

If the patient did not satisfy any of the listed criteria, the second decision factor, type of fracture, was displayed requiring a response from the user.

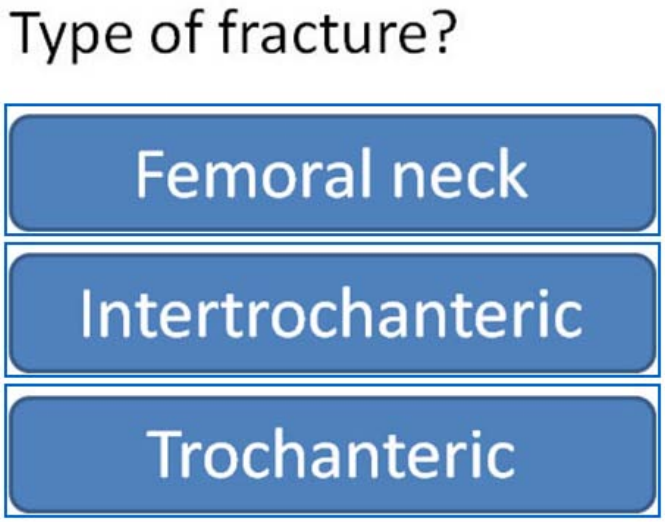

Figure 8: Second decision factor, type of fracture

For both femoral neck and intertrochanteric fractures, a surgical approach (ORIF) was recommended. The management of trochanteric fractures depended on whether the fracture was significantly displaced.

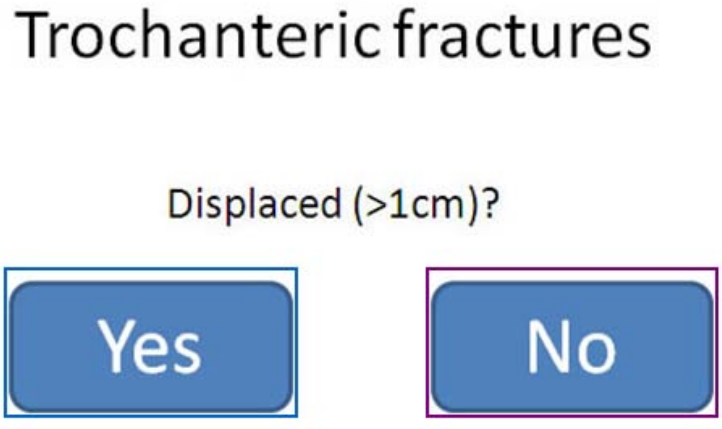

Figure 9: Management of trochanteric fractures

A surgical approach (ORIF) would be recommended for displaced fractures while non-operative management would be advised for those with minimal displacement (<1 cm).

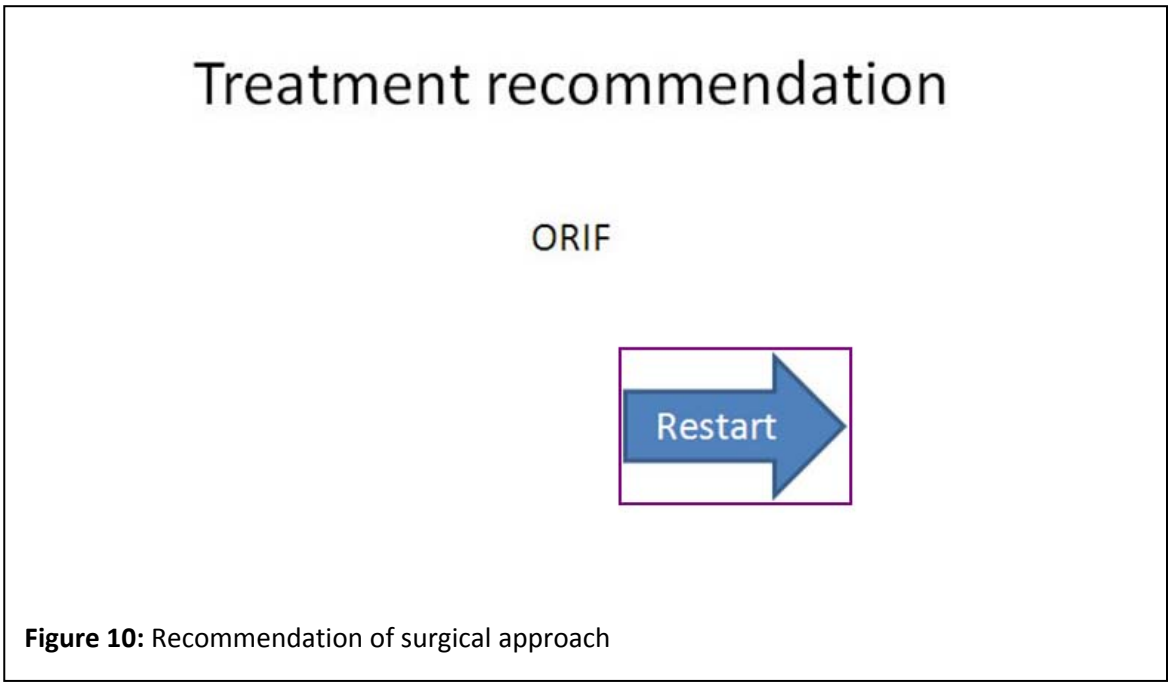

Figure 10: Recommendation of surgical approach

Design of questionnaire

A questionnaire was developed to obtain feedback from the primary decision makers, the providers. It was adapted from previous focus group interviews for another decision aid evaluation (see Figure 11).

Subjects and surveys

The study took place in Singapore where clinicians undergo various specialty trainings at tertiary hospitals. Twenty clinicians doing family medicine and orthopedic surgery in one of such hospitals were invited to participate in this evaluation as they had the potential of using this pathway in their daily clinical practice. The OHSU IRB indicated that this project did not require review as it did not meet the definition of research per 45 CFR 46.102(d). Similarly, this hospital

did not require IRB review. The heads of both departments were informed and their approval sought prior to the sending of emails. The questionnaire was sent to 10 men and 10 women via email with the website listed and an explanation of the purpose of the study. Each clinician was given 2 weeks to use the website and complete the questionnaire. A reminder was sent to participants after one week and another at the end of 2 weeks if there was no reply from them.

Hip Fracture Decision Aid

Computerized Program

Instructions to expert

You have been invited to participate in this survey because you have been identified as an expert in the management of hip fractures. We would like to ask your expert opinion on the computerized decision aid you are about to use. This decision aid is meant to be used by clinicians who are asked to provide advice on an appropriate management plan for hip fracture patients. Please give us your opinion on the usefulness of this decision aid from an expert's perspective.

Questions:

1. What do you think about the pictures, color scheme and ease of navigating through the program? Does the order of questions make sense? Is the language appropriate? Is it easy to understand? Is the length of the program appropriate?

2. Did we miss any critical content areas related to the management of hip fractures? If so, what are the areas we overlooked?

3. We have identified two decision factors (patient's current medical condition and type of fracture) which will be measured. Are there any other decision factors we should consider? Are the definitions for these factors reasonable?

4. Please give us some feedback about the management plans. Would you individualize the management plans specific to the important decision factors in the computer program? How?

5. How would this tool be useful to the clinicians? How would it be useful for the patients? How would you change it?

6. Please discuss any other questions or comments you may have.

Figure 11: Sample of questionnaire

RESULTS AND DISCUSSION

Out of twenty clinicians invited, 7 men and 3 women responded. Five were in orthopedic practice and the other five were in family medicine. Clinicians were selected as participants instead of patients as they are often the primary decision-makers for hip surgeries.

All of the respondents agreed that the pictures, color scheme and language were appropriate. They felt that the program was easy to navigate through and the order of questions made sense. The length of the program was also appropriate with clear endpoints. These features encourage the use of such decision aids in the short amount of time clinicians have with patients.

The clinicians were satisfied with the coverage of critical content areas and the use of evidence-based medicine. All orthopedic clinicians requested a further classification of femoral neck fractures into the various Garden types to determine the specific treatment required, whether for ORIF or arthroplasty.

The Garden classification scheme is based upon radiographic appearance and is used specifically for femoral neck fractures:

- Type 1 is an impaction fracture
- Type 2 is a non-displaced fracture
- Type 3 involves varus displacement of the femoral head
- Type 4 involves complete loss of continuity between fragments

This same group also asked for the addition of patient's age as a consideration.

All respondents felt that the two decision factors had no ambiguity and choices could be made quickly. One male orthopedic surgeon suggested adding the cause of the fracture as the third decision factor, whether it is an open or closed traumatic injury or a pathological fracture. This decision factor has implications on treatment as open fractures need to be operated without delay while there is some time for shared decision making for closed fractures. In the elderly, such

injuries can occur from direct trauma (e.g. fall) but have also been associated with pathologic fractures (e.g. from bone metastases).

All clinicians expressed the need to individualize management plans using evidence-based medicine as a guiding principle while also taking into account patient's ideas, concerns and expectations. One female family physician commented that this decision aid might not be useful to patients as it required a medially-trained person to determine the appropriate responses to the two decision factors. She added that the decision aid could be simplified by removing the second decision factor and replacing it instead with descriptions of possible surgical options such that patients can make informed decisions. Nevertheless, she felt patients would ultimately benefit from an evidence-based standardized approach to the consultation.

Two family medicine clinicians suggested placing the link to the references at the end rather than at the first page of the website. This would allow users to first look through the website, have a better understanding of the pathway and then decide which references would be helpful.

Three orthopedic clinicians preferred using the pathway on paper together with case notes as compared to doing it online. Decision aids can take the form of a wide variety of formats and the one most likely to be used should be promoted.

Limitations

This study provides preliminary data qualitative data that decision aids can provide a standardized approach to the decision process. It was not designed as a stand-alone product for patient use. Future work could include developing a decision aid that is written in plain language that patients could use prior to consultation with a surgeon.

CONCLUSION

Besides clinical content, developers of decision aids need to pay attention to important features such as language and ease of navigation. Decision aids are adjuncts to counseling (not replacements) to prepare providers and patients to discuss treatment options. There is great potential for the use of decision aids in orthopedic surgery with further work to be done on customizing them for local use by a larger group of clinicians.

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