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ABSTRACT

Objective To develop and user-test a patient decision aid portraying the benefits and harms of non-surgical management and surgery for Achilles tendon ruptures.

Design Mixed methods.

Setting A draft decision aid was developed using guidance from a multidisciplinary steering group and existing patient decision aids. Participants were recruited through social media.

Participants People who have previously sustained an Achilles tendon rupture and health professionals who manage these patients.

Primary and secondary outcomes Semi-structured interviews and questionnaires were used to gather feedback on the decision aid from health professionals and patients who had previously suffered an Achilles tendon rupture. The feedback was used to redraft the decision aid and assess acceptability. An iterative cycle of interviews, redrafting according to feedback and further interviews was used. Interviews were analysed using reflexive thematic analysis. Questionnaire data were analysed descriptively.

Results We interviewed 18 health professionals (13 physiotherapists, 3 orthopaedic surgeons, 1 chiropractor, 1 sports medicine physician) and 15 patients who had suffered an Achilles tendon rupture (median time since rupture was 12 months). Most health professionals and patients rated the aid's acceptability as good-excellent. Interviews showcased agreement among health professionals and patients on most aspects of the decision aid: introduction, treatment options, comparing benefits and harms, questions to ask health professionals and formatting. However, health professionals had differing views on details about Achilles tendon retraction distance, factors that modify the risk of harms, treatment protocols and evidence on benefits and harms.

Conclusion Our patient decision aid is an acceptable tool to both patients and health professionals, and our study highlights the views of key stakeholders on important information to consider when developing a patient decision aid for Achilles tendon rupture management. A randomised controlled trial evaluating the impact of this tool on the decision-making of people considering Achilles tendon surgery is warranted.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ We developed a decision aid that satisfies the International Patient Decision Aid Standards criteria.
⇒ We recruited an adequate number of participants for qualitative interviews, conducted one-on-one interviews which allowed for rich feedback to be gathered on the decision aid and reached data saturation.
⇒ The median age of people who sustained an Achilles tendon rupture was low (ie, results may not be applicable to middle-aged people who are also prone to Achilles tendon ruptures) and our findings may have low applicability to athletes.
⇒ We were not able to recruit certain types of health professionals (eg, no emergency medicine specialists, only one sports doctor and one chiropractor) and surgeons were under-represented despite being key stakeholders.
⇒ The systematic review used to inform estimates of benefits and harms had limitations (eg, pooled outcomes of different approaches to surgery and non-surgical management).

INTRODUCTION

The Achilles tendon is the strongest tendon in the human body, accounting for around 40% of all tendon ruptures.[1] Achilles tendon ruptures occur in 18–28 per 100 000 people in Canada[2] and 30–35 per 100 000 people in Denmark and Sweden.[3 4] The incidence of Achilles tendon ruptures is rising in both men and women, with the greatest increase seen in middle to older-aged men.[5] Studies suggest the rising rupture rates are due to the ageing population and more older adults (especially men) participating in high-intensity physical activity.[5–7]

Non-surgical management has been recently recognised as a viable treatment for Achilles tendon ruptures and gained popularity as a treatment choice.[5] The choice between non-surgical management and surgery to treat a ruptured Achilles tendon is complex. A 2019 systematic review of 29 studies (n=15 862 participants) comparing surgery and non-surgical management for

Achilles tendon ruptures[8] found that re-rupture rates were lower after surgery (2.3% vs 3.9%; risk ratio (RR) 0.43) but the risk of complications (primarily infection) were higher (4.9% vs 1.6%; RR 2.76). The review also found no difference in physical functioning, time to return to sport and time to return to work between the management approaches.

Patient decision aids help people make difficult decisions about their health. The International Patient Decision Aid Standards (IPDAS) Collaboration defines a patient decision aid as one that: makes patient decisions explicit, provides sufficient detail about a condition, its treatment options and associated benefits and harms and clarifies personal values.[9] A 2017 Cochrane review including 105 randomised controlled trials (RCTs) (n=31 043 participants) found high-quality evidence that decision aids for various medical decisions (eg, prostate cancer screening, colon cancer screening, medication for diabetes) increase knowledge of treatment options, reduce decisional conflict and reduce conflict surrounding personal values.[9] Patient decision aids have been used in other musculoskeletal conditions such as knee osteoarthritis[10–12] and chronic musculoskeletal pain,[13] to increase knowledge about treatments and reduce decisional conflict. However, there are currently no patient decision aids for Achilles tendon rupture management developed following the IPDAS criteria.

By developing and user-testing a patient decision aid for Achilles tendon rupture management, our aim was to understand what information patients need to know before deciding on whether to have surgery for their Achilles tendon rupture, how that information should be presented in a patient decision aid, and the acceptability of our investigator-developed decision aid.

METHODS

Initial decision aid design

The first draft of the decision aid was developed in PowerPoint and based on decision aid quality criteria as outlined in the IPDAS instrument.[14] A patient decision aid for people considering shoulder surgery[15] informed the topics and formatting used in the first draft. Key features adapted from this decision aid included the types of information presented (ie, section subheadings), icon arrays for explaining probability data and a statement encouraging patients to discuss the decision aid with a health professional. The data used to compare the benefits and harms of non-surgical management versus surgery were taken from a 2019 systematic review published in the BMJ.[8] Although this was the highest quality evidence available on this topic at the time, it should be noted that this systematic review included mostly observational studies and small randomised trials, pooled outcomes of different approaches to surgery (eg, open repair and minimally invasive) and non-surgical management and explored outcomes in the general population. These results may not account for the potential nuances between different forms of surgery and non-surgical management and represent subgroups (eg, athletes). We decided against separating surgery into open versus minimally invasive repair in the decision aid because there is little evidence to suggest one approach is superior to another (including in a recent large trial)[8 16] and evidence on adverse events is too uncertain to make a judgement on safety trade-offs with either approach. A multidisciplinary steering group was established and was comprised of physiotherapists, orthopaedic surgeons, behavioural scientists, epidemiologists and experts in decision aids and shared decision-making. This group reviewed the draft decision aid before semi-structured interviews with eligible participants were conducted. The initial draft of the decision aid is in online supplemental file 1.

Participants

We recruited 18 health professionals involved in the management of Achilles tendon ruptures via recruitment messages on social media platforms (Twitter and Facebook), Royal Prince Alfred Hospital, Concord Hospital and other medical and allied health clinics in the Sydney local area. None of the health professionals that were recruited for participation were directly involved in the design of the decision aid. Health professionals were eligible if they reviewed at least three patients each year who had sustained an Achilles tendon rupture and were able to understand and respond in English. There were no restrictions on the type of health professional recruited, their clinical setting, years of experience and country or region of practice. We recruited 15 people who had previously sustained an Achilles tendon rupture (including those who were currently seeking treatment for their rupture) via recruitment messages on social media platforms and recruitment flyers provided to patients by health professionals at Royal Prince Alfred Hospital and Concord Hospital. Patients were required to be 18 years or older and be able to understand and respond in English. There were no restrictions with regard to ethnicity or country of residence. The final sample size was based on reaching data saturation,[17] which we describe in section *2.4 Redrafting the decision aid*. We purposively sampled both health professionals and patients for diversity in gender, ethnicity and age. Health professionals were also purposively sampled for diversity in profession, clinical setting, years of experience and country or state of practice. After reading the participant information sheet, all eligible participants agreed to participate in the study via an online consent form. The study was started in August 2021 and finished in February 2023.

Data collection

Data collection consisted of pre-interview questionnaires, semi-structured interviews and acceptability questionnaires. The data collection process is summarised in box 1. We described the qualitative component of this study using the 32-item Consolidated Criteria for

Box 1 Data collection process

Pre-interview questionnaires used to purposively sample participants

Pre-interview questionnaires gathered details about demographics and either clinical experience or symptoms related to an Achilles tendon rupture (online supplemental files 3 and 4, respectively).

Semi-structured interviews

Interviews began with the interviewer screen-sharing the decision aid and introducing the participant to the Think-Aloud approach.[18] Participants were asked to read through each section of the decision aid and provide feedback as they deemed appropriate: 'As we go through each section of the decision aid, I want you to think out loud, giving any feedback that comes to mind. This can be positive or negative, about visual appeal, content, formatting, clarity, wording or anything else'. When participants were unsure of what to say, we prompted them to speak about specific features of a section (eg, images, formatting and wording)—particularly features we recently redrafted. Participants were also encouraged to think deeply about the reasoning behind their feedback (eg, 'What about this section makes it clear/unclear?') or what we could improve in the decision aid (eg, 'Can you think of a way to make this sentence clearer?'). We noted cases where different participants provided conflicting feedback (ie, we were unable to address both pieces of feedback at the same time) and presented this to subsequent participants to gain consensus (eg, by presenting two versions of a section). At all points of the interview, we attempted to avoid bias and leading questions. The interview guide for health professionals and patients are in online supplemental files 5 and 6, respectively.

Acceptability questionnaires

The questionnaires were delivered through Research Electronic Data Capture (REDCap) and data were anonymous. The health professional acceptability questionnaire (online supplemental file 7) included a 5-point Likert scale assessing agreement with various statements about the overall acceptability of the decision aid (eg, ease of use, clarity, perceived usefulness, impact on usual practice). The patient acceptability questionnaire (online supplemental file 8) included single-answer multiple-choice questions assessing the acceptability of different sections of the decision aid (excellent/good/fair/poor) and its overall presentation (eg, clarity, length, amount of information, neutrality and perceived usefulness).

Reporting Qualitative Research checklist (online supplemental file 2).[18]

All eligible participants completed a pre-interview questionnaire (online supplemental files 3 and 4) using Research Electronic Data Capture (REDCap) software, hosted at the University of Sydney. Data from the pre-interview questionnaires were used to purposively sample participants. We conducted semi-structured interviews to elicit health professional and patient views on what information should be included in a decision aid for Achilles tendon rupture management and how this information should be presented. These interviews also allowed for the assessment of decision aid useability and acceptability. Topic guides for the health professional and patient interviews are described in online supplemental files 5 and 6, respectively. At the end of the interview, participants completed an online questionnaire as a quantitative assessment of health professional and patient acceptability. Separate questionnaires were used for health professionals (online supplemental file 7) and patients (online supplemental file 8). The questionnaires were developed by the Ottawa Hospital Research Institute[19] and adapted to our decision aid.

All interviews were conducted by a researcher with experience in conducting qualitative interviews (CMPJ) or a physiotherapy honours student who received interview training by the experienced qualitative researcher (JFLG). Additional feedback provided by participants after the interview (eg, via email) was treated as part of the interview.

Screen recordings were inserted into 'Transcribe in Word' auto transcription software to generate a verbatim transcript of each interview. Ethics approval was obtained for this approach to transcription. Transcripts were manually verified against the screen recordings by JFLG to ensure accuracy and facilitate data familiarisation. After each interview, JFLG would watch the screen recording and create a summary of all feedback in Microsoft Word. Summaries were reviewed against the screen recording and/or transcripts by at least two coauthors to add missing or modify inaccurate information. The reviewers verified all changes to the summaries by rechecking the screen recording and/or transcripts and reaching consensus.

Redrafting the decision aid

An iterative cycle of redrafting the decision aid was employed as themes emerged (figure 1). Changes to the decision aid were presented to new participants to assess acceptability. This cycle continued until new feedback was no longer received, which we interpreted as data saturation.[17] We decided on what feedback to implement to each draft on the combined basis of perceived utility, frequency of feedback and input from the multidisciplinary steering group. Feedback was not implemented when it was not evidence-based or opposed to other feedback that the steering group decided was more useful. Reasons for not implementing feedback are in online supplemental file 9.

Data analysis

Pre-interview and acceptability questionnaires were analysed descriptively. For the health professional acceptability questionnaire (online supplemental file 7), Likert scale results were reported as medians (IQR) and the percentage of responses for each category. For the patient acceptability questionnaire (online supplemental file 8), opinions on each section of the decision aid were categorised as either 'excellent/good' or 'fair/poor' and expressed as counts and percentages.

Data from semi-structured interviews were analysed using reflexive thematic analysis using an inductive approach.[20] Reflexive thematic analysis is a well-established approach used to identify, analyse and report themes found within a qualitative data set.[21] After manually reviewing the transcripts to achieve familiarisation with the data, a coding matrix was formed in a Microsoft

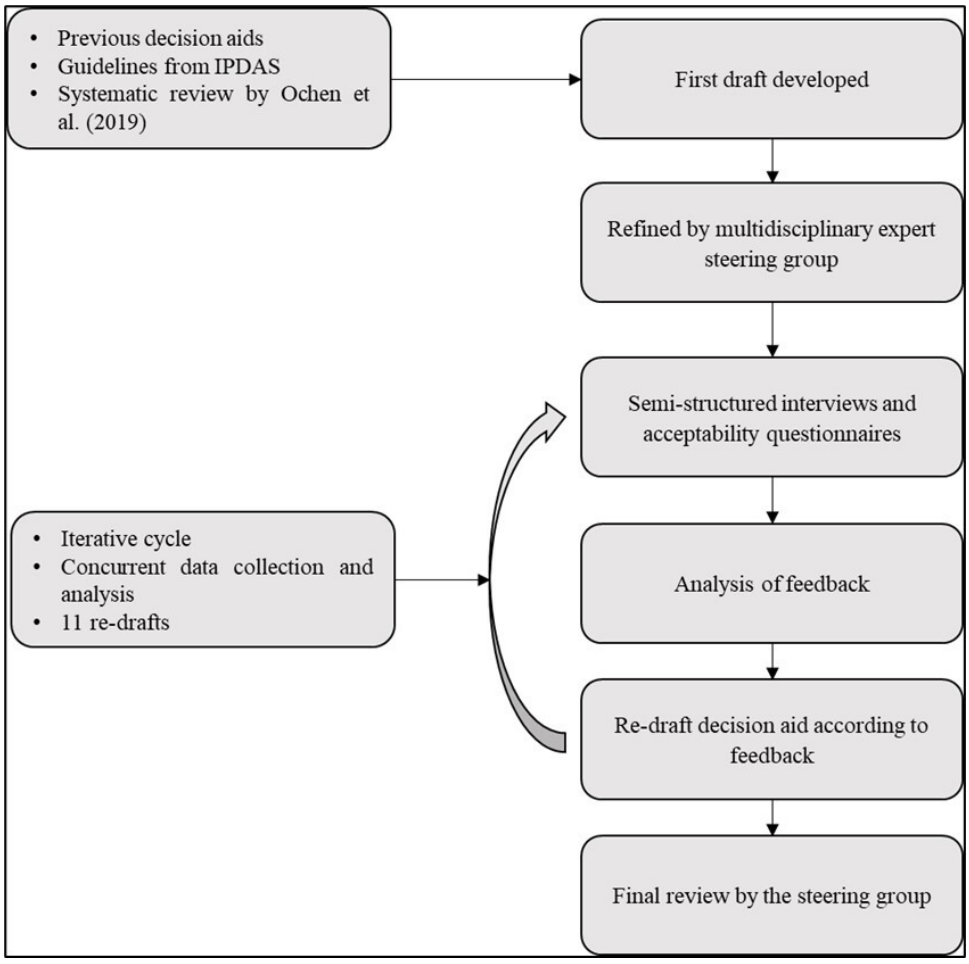

Figure 1 Flowchart summarising the development of the decision aid. IPDAS, International Patient Decision Aid Standards.

Excel spreadsheet. Summary points that captured similar ideas were grouped under a common code. At least three coauthors verified the coding matrix independently, checking their accuracy against both the recordings and transcripts. After forming codes, subthemes were formed, followed by broader themes. An example of the transition from codes to subthemes and themes is highlighted in figure 2. At least two coauthors were involved in distilling codes into subthemes and themes. These were categorised under the section headings of the decision aid. Data that did not fit into a specific section was grouped under 'Overall feedback' (eg, overall formatting suggestions). We transitioned back and forth as appropriate between developing and refining codes, subthemes and themes throughout the iterative process of data collection and analysis.

Patient or public involvement

Patients or members of the public were not involved in the design of this study.

FINDINGS

IPDAS criteria and user-centredness

The final draft of the decision aid satisfied 6 out of 6 criteria to be considered a patient decision aid, 6 out of 6 criteria to minimise the risk of harmful bias and 20 out of 23 criteria that improve the experience of using a patient decision aid as outlined by the International Patient Decision Aid Standards instrument checklist V.4.0 (online supplemental file 10).[22] It also met 10 out of 11 criteria for user-centred design according to the user-centred design 11-item measure (online supplemental file 11).[23]

Participant characteristics

We interviewed 18 health professionals (13 physiotherapists, 3 orthopaedic surgeons, 1 sports doctor and 1 chiropractor) and 15 patients (median time since rupture was 12 months). Due to the purposive sampling of participants, not all health professionals and patients that responded to the pre-interview questionnaire were invited to an interview (n=24 health professional and n=21 patient respondents were not invited to an interview). Participant characteristics are in table 1. Characteristics of respondents that were not invited to an interview are in online supplemental file 12. Characteristics appear largely similar between these groups.

Decision aid acceptability

All health professionals (n=18) and most patients (n=13) completed the acceptability questionnaire. Since we only started testing acceptability after the initial draft, two

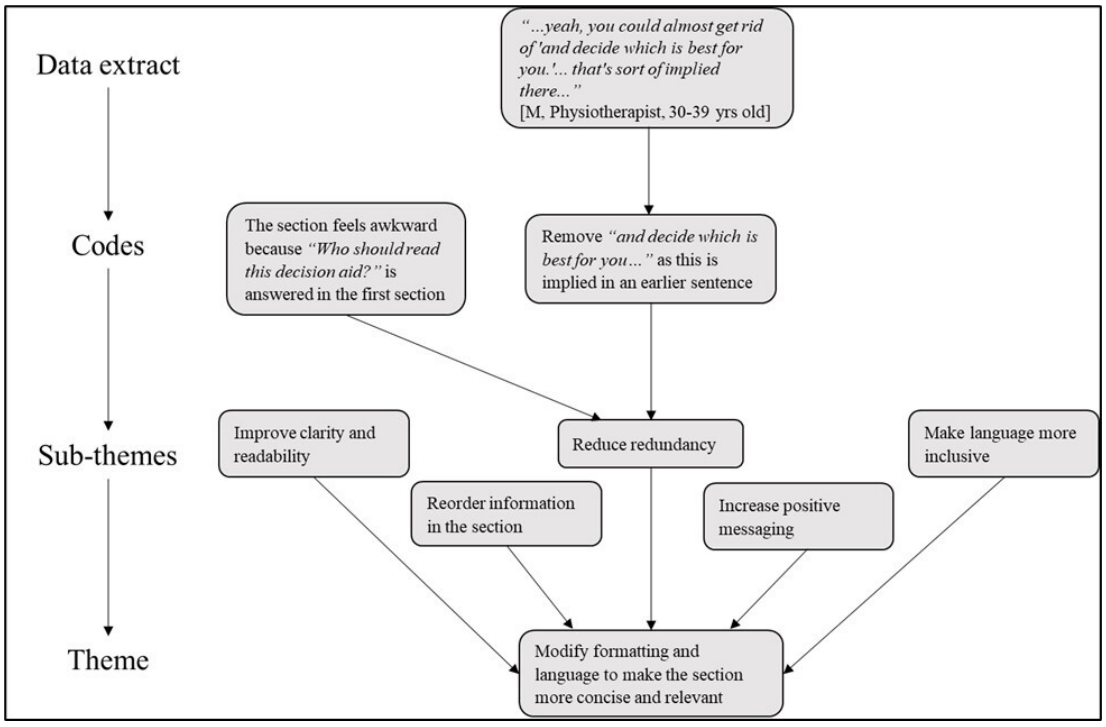

Figure 2 Formation of subthemes and themes.

patients did not complete the acceptability questionnaire. Most health professionals 'strongly agreed' or 'somewhat agreed' with statements on the utility, comprehensibility, ease of use and potential clinical benefit of the decision aid (table 2). Most patients rated each aspect of the decision aid as 'excellent' or 'good' and agreed with the amount of information and length of the decision aid (table 3).

Feedback on each section of the decision aid

Positive feedback across all sections of the decision aid included statements that key messages were clear, content was helpful or relevant, the formatting of a section was helpful or relevant and that the section appeared unbiased. Online supplemental file 13 provides an outline of the themes, subthemes and corresponding data extracts that emerged from each section of the decision aid. Broader feedback to improve the decision aid (as per the themes that emerged) and examples (subthemes) are summarised below. Feedback from three or more types of health professionals was labelled as 'multidisciplinary feedback'. The final draft of the decision aid is in online supplemental file 14.

Who should read this decision aid?

This first section includes the title-box of the decision aid, introduction to Achilles tendon ruptures and information about the target audience of the decision aid. Suggestions for improvement (themes) with examples (subthemes) included:

- Improve clarity regarding the role of the decision aid in the decision-making process (eg, patients, physiotherapists and orthopaedic surgeons wanted us to manage expectations about whether the decision aid guaranteed the patient would make the optimal choice).
- Improve clarity surrounding the target population (eg, physiotherapists wanted us to clarify that the decision aid was for treating complete (not partial) Achilles tendon ruptures).
- Introduce key components to consider about the decision (eg, multidisciplinary feedback suggested we highlight the personal, situational and biomechanical factors that influence the decision).
- Modify the formatting or language to make the section more concise, readable and relevant (eg, physiotherapists and patients thought we should use more layman language and reword sentences to reduce bias against surgery).

What are the treatment options covered in this decision aid?

This section summarises the non-surgical management and surgery for Achilles tendon ruptures. Suggestions for improvement included:

- Add more information on considerations that are unique to surgery (eg, physiotherapists wanted more information about the acute hospital experience after surgery).
- Present more information on specific details about rehabilitation (eg, physiotherapists and orthopaedic surgeons thought we should highlight the immobilisation period, need for mobility aids and boot-weaning).
- Modify the information presented on later stages of rehabilitation (eg, physiotherapists wanted us to clarify the time frames for return to different activities

Table 1 Characteristics of health professionals that manage Achilles tendon ruptures (n=18) and people who have sustained an Achilles tendon rupture (n=15)

Health professionals	Median (IQR) or N (%)
Profession, N (%)	
Physiotherapist	13 (72)
Orthopaedic surgeon	3 (17)
Chiropractor	1 (6)
Sports medicine physician	1 (6)
Age (years), median (IQR)	41 (31–49)
Females, N (%)	8 (44)
State of practice, N (%)	
New South Wales	13 (72)
Victoria	2 (10)
Tasmania	1 (6)
Queensland	1 (6)
Western Australia	1 (6)
Years of experience, median (IQR)	19 (8–25)
Clinical setting, N (%)	
Private practice	9 (50)
Public hospital	7 (39)
Emergency department	1 (6)
Aged care	1 (6)
Number of patients seen with Achilles tendon ruptures per year, median (IQR)	10 (5–21)
People who have sustained an Achilles tendon rupture	**Median (IQR) or N (%)**
Age (years), median (IQR)	30 (29–37)
Months since Achilles tendon rupture, median (IQR)	12 (4–12)
Females, N (%)	5 (33)
Highest level of education, N (%)	
University	13 (87)
High school or TAFE/trade	2 (13)
Country of birth, N (%)	
USA	12 (80)
UK	2 (13)
Australia	1 (7)
Employment status, N (%)	
Full-time	11 (73)
Part-time	4 (27)
Mechanism of injury, N (%)	
Running	4 (27)
Jumping	3 (20)
Landing from a jump	3 (20)
Changing direction quickly	2 (13)
Tackled or pushed	2 (13)
Walking	1 (7)
Interference with activity, N (%)	
Not at all	0 (0)
A little bit	0 (0)
Moderately	3 (20)
Quite a bit	6 (40)
Extremely	6 (40)
Underwent Achilles tendon surgery, N (%)	13 (87)
Return to work	
Successfully returned to work, N (%)	14 (93)
Months until return to work, median (IQR)	2.5 (0.6–5.8)
Return to previous level of activity	
Successfully returned to previous level of activity, N (%)	9 (60)
Months until return to previous activity, median (IQR)	6 (3–8)
Previous level of activity included sports, N (%)	12 (80)

n, number of people; TAFE, Technical and Further Education.

and change the exercises we listed in the rehabilitation protocol).
- Change the type of information presented in this section (eg, patients suggested we clarify the use of mobility aids and expand on factors that influence the length of rehabilitation).
- Emphasise that rehabilitation varies depending on the surgeon (eg, physiotherapists and orthopaedic surgeons suggested the following factors all depend on the surgeon performing the surgery: the initial bracing used, components of rehabilitation and time frames for rehabilitation).
- Modify formatting or language to improve readability and clarity (eg, some physiotherapists thought we should make it clearer that rehabilitation is the same following non-surgical management and surgery by bolding or underlining certain text).

Comparing benefits between non-surgical management and surgery

This section summarises the findings of a systematic review comparing the efficacy of non-surgical management and surgery. Suggestions for improvement included:
- Change information presented on tendon retraction distance (eg, some physiotherapists wanted us to highlight that tendon retraction distance was an important criterion for surgery, other physiotherapists wanted us to omit this information because it would introduce

Table 2 Acceptability questionnaire for health professionals that manage patients with Achilles tendon ruptures (n=18; 13 physiotherapists, 3 orthopaedic surgeons, 1 sports doctor and 1 chiropractor)

Acceptability statements	Strongly agree N (%)	Somewhat agree N (%)	Neither agree nor disagree N (%)	Somewhat disagree N (%)	Strongly disagree N (%)	Likert scale median score (IQR)*
It will be easy for me to use	14 (78)	4 (22)	0 (0)	0 (0)	0 (0)	5 (5–5)
It will be easy for me to understand	14 (78)	4 (22)	0 (0)	0 (0)	0 (0)	5 (5–5)
It will be easy for me to experiment with using it before making a final decision to adopt it	9 (50)	6 (33)	3 (17)	0 (0)	0 (0)	4.5 (4–5)
The results of using the decision aid will be easy to see	2 (11)	10 (56)	6 (33)	0 (0)	0 (0)	4 (3–4)
This decision aid is better than how I usually go about helping patients decide about Achilles surgery	7 (39)	5 (28)	6 (33)	0 (0)	0 (0)	4 (3–5)
This decision aid is compatible with the way I think Achilles tendon rupture should be managed	5 (28)	8 (44)	5 (28)	0 (0)	0 (0)	4 (3.25–4.75)
Compared with my usual approach, this decision aid will result in my patients making more informed decisions	10 (56)	4 (22)	4 (22)	0 (0)	0 (0)	5 (4–5)
Using this decision aid will save me time	5 (28)	5 (28)	7 (39)	1 (6)	0 (0)	4 (3–4.75)
This decision aid is a reliable method of helping patients make decisions about Achilles tendon surgery	7 (39)	8 (44)	3 (17)	0 (0)	0 (0)	4 (4–5)
Pieces or components of the decision aid can be used by themselves	6 (33)	9 (50)	1 (6)	2 (11)	0 (0)	4 (4–5)
This type of decision aid is suitable for helping patients make value laden choices	7 (39)	9 (50)	1 (6)	0 (0)	1 (6)	4 (4–5)
This decision aid complements my usual approach	10 (56)	6 (33)	2 (11)	0 (0)	0 (0)	5 (4–5)
Using this decision aid does not involve making major changes to the way I usually do things	7 (39)	6 (33)	4 (22)	1 (6)	0 (0)	4 (3.25–5)
There is a high probability that using this decision aid may cause/result in more benefit than harm	8 (44)	7 (39)	3 (17)	0 (0)	0 (0)	4 (4–5)

*Likert scale from strongly agree (5) to strongly disagree (1).
n, number of health professionals.

anxiety, was based on anecdotal evidence and was not relevant to patients).

- Change the information presented on benefits (eg, physiotherapists wanted us to list the specific outcome measures from the systematic review and present numerical data of these outcome measures).
- Change description of the study providing benefits data (eg, physiotherapists thought we should highlight the study population).
- Modify how the research findings are described or presented (eg, some patients wanted us to reiterate that the research was only based on averages).
- Modify formatting or language to improve readability and clarity (eg, patients wanted us to simplify the description of the research findings on benefits).

Comparing harms between non-surgical management and surgery

This section summarises data from a systematic review on the potential harms of each treatment option. Suggestions for improvement include:

- Change information on harms (eg, multidisciplinary feedback suggested we add probability data on other outcomes like the risk of tendon lengthening, deep vein thrombosis and failed non-surgical management).
- Change information on factors that modify the risk of harms (eg, physiotherapists and orthopaedic surgeons suggested we emphasise that factors including comorbidities could expose patients to a greater risk of harms).
- Change the way the statistics are presented (eg, some patients wanted us to remove numeric probability data and replace them with general statements).
- Modify the level of detail of the section (eg, patients wanted us to add more detail like the certainty of the data and list examples of complications, others wanted us to reduce detail by removing the additional information describing the study the data comes from).

Table 3 Acceptability questionnaire for people who have sustained an Achilles tendon rupture (n=13)

Acceptability items	N (%)
Information presented was 'excellent' or 'good'	
I tore my Achilles tendon: should I have surgery?	11 (85)
Who should read this decision aid?	10 (77)
What are the treatment options covered in this decision aid (non-surgical options)?	9 (69)
What are the treatment options covered in this decision aid (surgery)?	10 (77)
Comparing benefits between non-surgical management and surgery (key message)	9 (69)
Comparing harms between non-surgical management and surgery	10 (77)
Summary of benefits, harms and practical issues	11 (85)
Questions to consider when talking with your health professional	12 (92)
The length of the decision aid was	
Just right	13 (100)
Too short	0 (0)
Too long	0 (0)
The amount of information was	
Just right	12 (92)
Too little	0 (0)
Too much	1 (8)
The presentation was	
Balanced	11 (85)
Slanted towards surgery	1 (8)
Slanted towards non-surgical options	1 (8)
Agreed they would have found this decision aid useful when making the decision on surgery or not	13 (100)
Agreed this decision aid would have made their decision easier	10 (77)
Agreed there was enough information in the decision aid to help people decide on surgery or not	12 (92)

n, number of people who have sustained an Achilles tendon rupture.

- Modify formatting or language to make the section more concise, readable and clear (eg, some patients suggested we make the infographic array on the probability of harms out of 50 'people' instead of 100).

Summary of benefits, harms and other practical issues

This section provides a summary of the benefits, harms and other significant practical issues involved when deciding on Achilles tendon rupture management. Suggestions for improvement include:

- Change information presented in the summary (eg, physiotherapists and an orthopaedic surgeon thought we should emphasise that compliance to the rehabilitation protocol is more important in non-surgical management).
- Add more types of information to the summary (eg, patients wanted information on where to find services that offer surgical management, details on the average cost of surgery and pain experience).
- Modify language to make the section more readable, concise and relevant (eg, some physiotherapists suggested we remove information on the cost of surgery since it would be covered by the public health system).

Questions to consider when talking with a health professional

This section provides a list of questions that patients are encouraged to discuss with their health professionals. Suggestions for improvement include:

- Add questions to facilitate further discussion about individual circumstances (eg, multidisciplinary feedback suggested we emphasise questions that probe patients' values, long-term goals and understanding about the rehabilitation process).
- Add questions that address a wider array of patient concerns (eg, patients wanted us to probe discussion surrounding return to activities, financial considerations and serious comorbidities).
- Reduce the length of the section (eg, health professionals wanted us to reduce repetition and remove questions that they felt were not relevant to patients).
- Modify language and formatting to improve readability and clarity (eg, some physiotherapists suggested we organise questions in order of importance).

Overall feedback

Overall feedback included:

- Formatting suggestions (eg, physiotherapists suggested we have benefits and harms on the same page, some patients wanted the font to be larger throughout).
- Distribution recommendations (eg, physiotherapists thought the decision aid would be useful in public health and private health settings, one physiotherapist recommended it would require more information before being distributed to athletes).
- Add further information (eg, patients wanted a 'questions and answers' section and a website link with further information on Achilles tendon ruptures).

DISCUSSION

Summary of findings

Most health professionals and people who had previously sustained an Achilles tendon rupture rated acceptability as 'excellent' to 'good'. Interviews highlighted consensus with most aspects of the decision aid (eg, who should read the decision aid, comparison of harms, summary of benefits, harms and other practical issues, questions to ask a health professional, images, graphs, formatting and amount of information) and some varied perspectives among health professionals on certain features of the decision aid (eg, tendon retraction distance, factors that modify the risk of harms, treatment protocols and evidence on benefits and harms). To understand whether this decision aid increases patient knowledge, reduces decisional conflict and increases decision satisfaction, an RCT evaluating it against another decision support tool and/or other traditional forms of presenting surgical and non-surgical options is warranted.

Strengths and limitations of this study

Strengths of this study included developing a decision aid that satisfied the IPDAS criteria, recruiting an adequate number of participants for qualitative interviews and conducting one-on-one interviews which allowed for rich feedback to be gathered on the decision aid. Limitations included having a small sample size for the acceptability questionnaires, the median age of people who sustained an Achilles tendon rupture was low (ie, results may not be applicable to middle-aged people who are also prone to Achilles tendon ruptures), surgeons were underrepresented despite being key stakeholders, not being able to recruit certain types of health professionals (eg, no emergency medicine specialists, one sports doctor and one chiropractor), not conducting repeat interviews (eg, participants interviewed later would have missed earlier drafts and may have praised features we omitted), not including data from a large 2022 RCT on benefits and harms (although these results do not change the conclusions we present in the decision aid), and low applicability to athletes. The systematic review used to inform estimates of benefits and harms also has limitations as described in section 2.1. To account for the lack of emergency medicine specialists, we purposively sampled for physiotherapists with experience in the emergency department (3 out of 13 physiotherapists had experience in the emergency department).

Meaning of the study

Our study highlighted the difficulty of presenting descriptions of a treatment protocol in a patient decision aid. Most health professionals suggested that the protocol we presented did not align with their practice. Specifically, having the same description of rehabilitation for non-surgical management and surgery caused a substantial divide between health professionals. Some health professionals agreed that rehabilitation was the same, but others thought we should present different protocols for non-surgical management and surgery. Those who disagreed with presenting the same protocol claimed that surgery helped people weight-bear sooner, wean off heel wedges faster and remove their bracing sooner. This point of view may stem from the belief that surgery allows for the tendon to heal faster. However, we decided to leave the description of rehabilitation as the same for both options because the systematic review by Ochen *et al*[8] showed no evidence people reached milestones earlier with surgery.[8] To account for service providers that use separate rehabilitation protocols for non-surgical management and surgery and subtle differences in protocols overall, we added a disclaimer statement in the rehabilitation box suggesting that the length and components of rehabilitation may vary depending on the healthcare provider.

One physiotherapist suggested that accelerated functional rehabilitation protocols drastically reduced re-rupture rates in non-surgical management. The physiotherapist suggested we present this result in the *Comparing harms* section. A sensitivity analysis from the systematic review where we gathered data for benefits and harms did not support this claim.[8] Additionally, while some orthopaedic surgeons and a few physiotherapists agreed to have also used accelerated functional rehabilitation protocols, we were uncertain whether all contemporary non-surgical management protocols involved this practice and therefore omitted this data from our decision aid. For the sake of accuracy, it may be prudent to implement an accelerated functional rehabilitation protocol when presenting the decision aid in facilities where such a protocol is used. The same can be said for implementing changes to other aspects of rehabilitation (eg, time frames for rehabilitation milestones, types of bracing) presented in the treatment options section. Overall, this highlights the importance of individualisation at every step of the decision-making process.

The inclusion of tendon retraction distance was another point of contention among health professionals. A sports doctor and some physiotherapists agreed it should be highlighted in the decision aid. Other physiotherapists thought retraction distance should only be mentioned if the degree of retraction indicating surgery could be quantified using research evidence.

The amount of musculotendinous retraction indicating surgical intervention for a ruptured Achilles tendon is unclear. Some studies define a distance between ruptured tendon ends of greater than 5–10 mm as an indication for surgery.[24 25] However, there are no trials comparing non-surgical management and surgery for specific tendon retraction distances (eg, 5 mm, 10 mm and 15 mm). The arbitrary cut-offs used to indicate surgery may simply be the distance where non-apposition (ie, ruptured tendon ends are not physically contacting or in close proximity) can be detected reliably with imaging.[25] These cut-offs may also stem from the clinical expertise of orthopaedic surgeons. Surgeons may be discouraged from recommending non-surgical management to patients with large pre-intervention retraction distances, in anticipation that larger distances are more likely to result in poorer outcomes when treated non-surgically (either in theory or from experience). On the other extreme, another group of physiotherapists thought the statement on retraction distance should be excluded altogether. They claimed it was a surgeon's diagnostic tool and hence was not relevant to patients, was only based on anecdotal evidence and could introduce anxiety. We decided to include a statement on retraction distance nonetheless as we thought it would support the idea that every case varies.

Comparisons to existing research

A 2021 study that developed a patient decision aid for people considering shoulder surgery followed a similar development process to the one used in our study.[15] They conducted semi-structured interviews and online questionnaires to elicit views on what information to include, how to present the information and the acceptability of the decision aid. Some overlapping themes included a focus on clarifying the target population, discussing the decision aid with a health professional, a more detailed description of the evidence, reinforcing that every case is different, and that evidence only represents averages. Aspects we adapted from the shoulder study that demonstrated high acceptability in our study included the icon array on probability of harms and statement urging the discussion of the decision aid with a health professional. A theme in our study that was not present in the shoulder study included emphasising factors that modify the risk of harms like comorbidities and non-compliance with healthcare instructions.

Currently, there are no other patient decision aids for Achilles tendon rupture management developed following the IPDAS criteria. Compared with a 2022 patient decision aid for Achilles tendon ruptures developed by Healthwise,[26] our study provided more detail about how feedback was used to guide development, presented numerical estimates of benefits and harms in the decision aid and followed guidance from the IPDAS criteria. A 2021 study outlined a protocol to develop and test a patient decision aid for Achilles tendon rupture management.[27] In comparison to their planned development process, our study used the Think-Aloud approach to semi-structured interviews and reviewed the decision aid as new themes emerged, rather than round-by-round.

Implications for future research

This decision aid should be evaluated in an RCT including people who have ruptured their Achilles tendon and are deciding between non-surgical management and surgery. An online RCT investigating the impact of a recently developed decision aid for people considering shoulder surgery showed it had largely no effect on decisional outcomes.[28] The authors postulated that the lack of an effect may be due to the online setting of the trial, which prevented participants from discussing the decision aid with a health professional. Thus, our decision aid should be tested as part of a clinical encounter to explore its impact on both health professionals who counsel patients facing the decision and patients facing the decision themselves. Interviews with health professionals highlighted potential clinical settings to test the effectiveness of our decision aid, including first-contact settings such as the emergency department, general practice clinics and private physiotherapy clinics.

CONCLUSION

Our study elicited the views of health professionals and patients to develop a patient decision aid presenting evidence-based information on non-surgical management and surgery for Achilles tendon ruptures. Interviews showed health professionals and patients were mostly in agreement with the information and the way it was presented across the entire decision aid. Acceptability testing suggested we developed an acceptable decision aid that has potential for use in a clinical setting. Future research should compare our decision aid with other forms of information for Achilles tendon ruptures in an RCT to evaluate whether implementing this decision aid is clinically worthwhile.

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