Evaluating the MATCH-IT tool: a shared decision-making tool for acute musculoskeletal pain

Evaluation of accessibility, usability, and inclusivity , and recommendations for improvement in individuals with limited health literacy

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Abstract

Background: Shared decision making (SDM) is particularly relevant for individuals with limited health literacy (HL), who often struggle to process medical information and tend to adopt a passive role during consultations. Despite this, existing patient decision aids are frequently inaccessible to this population. Acute musculoskeletal pain (MSP) represents a clinically relevant context for SDM, given the multiple available treatment options and the importance of patient values in treatment decisions.

Aim: The aim of this study was to assess the inclusivity of the MATCH-IT tool — a multi-comparison SDM tool for acute MSP — and to identify opportunities for improvement in order to optimise its accessibility and usability for individuals with limited HL.

Methods: A three-phase, user-centred qualitative study was conducted. In the first phase, five HL experts evaluated the tool through semi-structured interviews. Following expert feedback, a graphic designer implemented a selection of suggested modifications in a second phase. In the third phase, ten patients who had used the modified tool during a real-life primary care consultation were interviewed. Thematic analysis was performed using NVivo in both phase 1 and 3.

Results: Expert evaluation identified seven key areas for improvement: 1) overall structure and content, 2) language and terminology, 3) matrix layout and visual design, 4) the population diagram, 5) filters, 6) practical aspects and navigation, and 7) accessibility. Following expert feedback, a selection of suggested changes were implemented, primarily linguistic and visual adaptations. More substantial structural modifications could not be realised due to technical constraints. Patient user-testing revealed three overarching themes: 1) challenges related to the SDM process and tool integration, 2) difficulties with language and comprehensibility, and 3) problems with layout, design, accessibility, and digital functionality. Across both phases, recurring barriers included information overload, complex medical terminology, non-intuitive visual design, and difficulties interpreting numerical and comparative data. Notably, the use of the tool did not automatically result in meaningful shared decision making, with some patients reporting limited perceived involvement and others expressing a preference for a physician-led approach.

Conclusion: The MATCH-IT tool shows promise as a support tool for SDM in acute MSP, but substantial barriers to accessibility and usability remain, particularly for individuals with limited HL. Effective implementation requires not only further iterative refinement of the tool itself, but also its integration within a broader communication approach, including clinician training and explicit guidance of the decision-making process.

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Introduction

Shared decision making for individuals with limited health literacy

Health literacy (HL) can be defined as the ability of individuals to access, understand, appraise, and apply health information in order to make appropriate health decisions.[1] The prevalence of low HL levels remains high in Europe, where 33% to 50% of the population is unable to comprehend basic health information.[2] Shared decision making (SDM) refers to a collaborative process in which clinicians and patients work together to make healthcare decisions, taking into account the best available evidence as well as the patient's values and preferences.[3] SDM may be particularly relevant for individuals with limited HL, who often struggle to process medical information, tend to adopt a more passive role during consultations, and are thus at risk of limited meaningful participation in SDM.[4] Despite these challenges, SDM has been associated with positive outcomes in patients with limited HL, including improved knowledge, empowerment, communication quality, and reduced decisional conflict, highlighting the importance of inclusive and adapted SDM approaches.[4]

Limitations of Existing Patient Information and Decision Aids

Despite their potential value, patient information materials and decision aids are often overly complex or pitched at an excessively high level.[5] Furthermore, they are primarily "functionally" simplified rather than being designed to be genuinely inclusive and accessible for users with varying levels of HL.[6] Evidence from an analysis of Dutch patient decision aids (PtDAs) supports this concern, showing that most tools performed worse on content-related HL principles, despite layout-related understandability criteria.[7] Many PtDAs used long sentences, failed to clearly define medical terminology, and relied on verbal risk communication alone, which may increase ambiguity in risk perception, particularly for individuals with limited HL.[7] In addition, neutral framing of risk information was rarely applied explicitly, despite the known susceptibility of individuals with limited HL to framing effects.[7] Together, these findings suggest that many PtDAs remain insufficiently accessible in practice, reinforcing the need for more inclusive design approaches that systematically integrate HL principles into both content and risk communication.

Strategies to Bridge the Evidence-to-Decision Gap

Recent research has explored strategies to improve the accessibility and comprehension of decision-relevant information. An effective approach would be layered information or progressive disclosure, in which key messages are presented first, followed by optional expandable layers containing more detailed information, such as numerical data or confidence intervals.[8] It has been shown that absolute risks, percentages, and natural frequencies should be used instead of relative risks, which would be more difficult to interpret. Icon arrays may support this approach, as they have been shown to enhance users' understanding of medical information.[9, 10]

In addition, collaboration with patients through user-centred design has increasingly been recognised as essential in the development of decision-support tools. This framework has been applied in several projects developing patient decision aids and was recommended by the International Patient Decision Aid Standards (IPDAS) Collaboration.[11-13]

Burden of Acute Musculoskeletal Pain

The implementation of the abovementioned strategies could be of particular relevance in clinical domains where decision making is complex and patient involvement is essential, such as in musculoskeletal pain (MSP). Musculoskeletal disorders constitute a major global public health problem and are among the leading causes of disability worldwide. According to the Global Burden of Disease (GBD) 2021 study, an estimated 1.686 billion people were living with musculoskeletal disorders globally in 2021, representing an increase of approximately 95% compared with 1990. Although age-standardized rates of prevalence, incidence, disability-adjusted life years (DALYs), and mortality have generally declined over recent decades, the absolute burden of musculoskeletal disorders continues to rise and is projected to increase further in the coming years.

This growing burden is largely attributed to global population aging, population growth, and increased life expectancy, which together lead to the accumulation of musculoskeletal disease risk over the life course. In addition, improvements in medical diagnostics and health surveillance—particularly in low- and middle-income countries—have contributed to more comprehensive detection and reporting of MSDs. Lifestyle-related factors, including reduced physical activity, increasing obesity, and changes in occupational and ergonomic exposures associated with industrialization and urbanization, are also considered important contributors to the rising prevalence of musculoskeletal disorders. Despite declining age-standardized rates, musculoskeletal disorders remain highly disabling conditions with a substantial impact on daily functioning and health systems worldwide.[14] This increasing burden is reflected in daily clinical practice, where general practitioners frequently manage patients with acute musculoskeletal complaints. For general practitioners, the management of acute MSP is a core clinical responsibility.

Musculoskeletal pain in individuals with limited health literacy

A substantial proportion of patients presenting with acute MSP have limited HL.[15] Several studies have demonstrated negative associations between HL and pain knowledge, medication adherence, and pain-related outcomes.[16] Suboptimal self-management outcomes may partly be explained by low HL, as patients may lack an accurate mental model of pain and recovery. Beliefs about the body and pain strongly influence behaviour and emotional responses in MSP. Misconceptions—for example, the belief that pain necessarily indicates structural damage—can promote unnecessary interventions, fear, and avoidance behaviour.[17]

Shared Decision Making in Acute Musculoskeletal Pain

In acute MSP, patients are often faced with choices between pharmacological treatments (e.g., NSAIDs, opioids), non-pharmacological approaches (e.g., physical therapy, activity modification), or watchful waiting, each associated with different risks, side effects, and impacts on daily functioning. These treatment options often exist in a state of equipoise (i.e. there are multiple reasonable options, with no single clearly superior choice). SDM is especially appropriate in such preference-sensitive situations where patient values play a central role.[18]

Just as has been proven in other health domains, evidence suggests that many patients with acute MSP wish to be actively involved in decisions regarding their care: more than half of patients report a desire to participate in the decision-making process, and SDM has been associated with higher patient satisfaction.[19] Involvement of patients in decision-making has also been linked to a more positive physician–patient relationship, whereas limited use of SDM is associated with poorer relationships, suboptimal self-management, and poorer health outcomes.[20] In some settings, limited patient involvement and ineffective clinician–patient communication have been associated with inadequate treatment adherence.[20]

Study Aim

Against this background, a SDM tool for the treatment of MSP was developed, presented to experts for refinement, and subsequently user-tested and evaluated among individuals with low HL. The aim of this study was to assess the inclusivity of the tool and to identify opportunities for improvement in order to optimise its accessibility and usability for individuals with limited HL.

Materials and methods

The Match-it tool

The tool under investigation was the MATCH-IT Tool: a multi-comparison SDM-tool for the treatment of acute MSP, excluding low back pain. The tool was developed based on a published meta-analysis[21] and a clinical guideline[22], by the MAGIC Evidence Ecosystem Foundation. This is an independent, not-for-profit organisation based in Oslo, Norway. The organisation consists of clinicians and evidence based medicine (EBM) experts who aim to improve patient care globally by enabling the creation, dissemination, and implementation of trustworthy guidance. (https://www.magicevidence.org). The MATCH-IT tool was originally designed as a clinician-facing decision-support tool. For the purpose of this study, it was subsequently adapted to enable its use within patient consultations and to support patients' engagement in SDM.

Study design and overall approach

This study consisted of three consecutive phases. During the first phase, HL experts evaluated the tool with regard to understandability and usability prior to patient testing. This was followed by the second phase, where some of the improvements, suggested by the experts, were implemented by a graphic designer. In the third phase, a qualitative research design was applied to explore user experiences of the MATCH-IT tool in the context of SDM in MSP.

A user-centred design approach was adopted, incorporating an iterative development process in which findings from each phase informed subsequent adaptations of the tool. This approach focused on users' needs and preferences, with repeated testing aimed at improving usability and comprehensibility. Patients were actively involved in a participatory process to evaluate the tool and propose improvements. User experience was explored across the different dimensions of Morville's Honeycomb model (Appendix 1), with particular emphasis on usability.

Thematic analysis using NVivo (version 15.3) was applied across both phases. Coding was performed iteratively, with themes emerging progressively throughout data collection and analysis. Although an inductive approach was primarily used, Morville's Honeycomb model served as a sensitising framework to organise findings. As the general analytic approach in both phase 1 and 3 was similar, only phase-specific aspects are described below.

Ethical approval was obtained from the Research Ethics Committee (reference number S68512) prior to study initiation (Appendix 2).

As the study initially aimed to include both Dutch- and French-speaking participants, the MATCH-IT tool was translated from English into Dutch and French using a forward–backward translation process, assisted by native speakers. During translation, efforts were made to adapt technical terminology into layman terms, in collaboration with a colleague experienced in writing lay-language materials. Additional adaptations were proposed by HL experts.

Phase 1: Expert interviews

Study design

The first phase consisted of a qualitative interview study with HL experts. Experts were given access to the MATCH-IT tool prior to the interview to allow independent review. During the interview, the tool was discussed and evaluated interactively.

All interviews were conducted by the same researcher (RV), using a semi-structured interview guide (Appendix 3).

Participants and setting

A convenience sample of five HL experts was recruited based on their expertise in HL. Potential participants were approached directly and invited to participate.

Interviews were conducted online via Microsoft Teams and lasted between 30 and 60 minutes.

Data collection

Interviews were audio-recorded and transcribed verbatim within two weeks of data collection.

Data analysis

A thematic analysis was conducted as described above. All interviews were independently coded by two researchers (RV and JW). After coding, results were compared and discussed until consensus was reached. No major discrepancies were identified between coders. Identified themes and suggested improvements were compiled and used to adapt the tool.

Data were pseudonymised prior to analysis and fully anonymised after completion of the study.

Phase 2: implementation of improvements in the tool

As mentioned above, the first phase was followed by the second phase, where some of the improvements, suggested by the experts, were implemented by a graphic designer.

Phase 3: User-testing in patients

Study design

The second phase consisted of a qualitative interview study in patients, aimed at evaluating user experiences with the MATCH-IT tool during real-life clinical consultations.

Participants and recruitment

Patients were recruited through convenience sampling in primary care settings. Two general practice trainees (RV and JW) recruited participants across three general practices.

Patients were eligible for inclusion if they were aged 18 years or older, consulted their general practitioner for acute MSP* (excluding low back pain), and were able to provide informed consent. Patients were excluded if they presented with chronic pain or low back pain, had a language barrier (defined as insufficient proficiency in Dutch, French, or English), were unable to provide informed consent, or were not capable of participating in an interview, for example due to cognitive impairment.

HL was initially incorporated as an inclusion criterion. To assess HL, we chose to work with the Health literacy questionnaire (2014)[1] (appendix 4) We chose this questionnaire after deliberately weighing the strengths and limitations of the different existing measurement tools for HL (appendix 5). We selected 3 questions from the 3 different scales of the HLQ in which patients achieved the lowest scores.[23] The initial inclusion process is shown in appendix 6.

At study onset, a cut-off score of ≤ 6/14 on these three items was predefined to identify patients with lower HL. However, during recruitment it proved difficult to identify patients meeting this criterion, as all screened participants scored above this threshold. In consultation with the research team, the cut-off was subsequently relaxed and later, as recruitment challenges persisted, the decision was ultimately made — prior to continued inclusion — to remove the HL cut-off entirely.

As a result, HL was no longer used as a strict inclusion criterion, and the final study sample represented a heterogeneous group in terms of HL levels. HL scores were nevertheless recorded for all participants and are reported in the Results section.

Patients were not informed about the study prior to booking their consultation and were invited to participate during the consultation.

*Examples of eligible conditions included knee pain, shoulder pain, foot pain, carpal tunnel syndrome, and lateral epicondylitis.

Procedure

Participating patients received an information letter and provided written informed consent prior to inclusion. The HLQ items were administered prior to inclusion for screening purposes only and were not used to guide the consultation or adapt the intervention. During the consultation, the clinician used the MATCH-IT tool together with the patient to support SDM. Clinicians followed a standardized step-by-step consultation protocol (Appendix 7). The version of the tool used in this phase incorporated adaptations suggested during Phase 1.

Data collection

User experiences were assessed through semi-structured interviews by one of the researchers (RV or JW). These interviews were conducted approximately one to three weeks after the consultation (mean interval: two weeks).

Interviews were conducted via telephone or video call (Microsoft Teams), and were audio-recorded. In the case of video calls, recordings were automatically transcribed using Microsoft Teams software and subsequently checked for accuracy.

Interviews were transcribed verbatim, and analysed in the original language. The interview guide (Appendix 8) was based on a previously validated guide used in the SHARE-IT [24] project and was adapted to fit the current study context.

Data analysis

A thematic analysis was conducted as described above. An initial subset of four interviews was independently coded by two researchers (RV and JW). Following comparison, a consensus was reached on the coding framework. The remaining six interviews were coded by one researcher (JW), using the established coding structure.

Themes were refined and, where appropriate, merged during the analysis process.

Sample size was determined pragmatically in consultation with the research team. Data collection continued until no substantially new themes emerged from successive interviews, indicating that thematic saturation was being approached based on principles of data saturation.

Data management

All data were pseudonymised, with participants assigned unique identification numbers. The key linking identifiers to participants was stored securely and accessible only to the researchers. After completion of the study, all data were anonymised and the identification key was destroyed.

Results

Phase 1: Expert interviews

Expert Characteristics

During the first phase of the study we interviewed five HL experts. These interviews took place in December 2024. In table 1, an overview of the characteristics of the experts can be found.

	Gender	Professional background and expertise in HL
Expert 1	Male	Professor at U Laval and ECI, leading a research program on SDM in French Speaking African countries
Expert 2	Female	Health psychologist with a doctoral degree in medicine. Her primary research interests lies in healthcare communication, health disparities, self-management and SDM.
Expert 3	Female	Health scientist currently pursuing a PhD, specialised in HL and SDM.
Expert 4	Female	Professor at Maastricht University, whose main research focus is Implementation of Clinical Practice Guidelines
Expert 5	Female	Researcher at U Hasselt who focusses on health management

Table 1: Expert characteristics.

Interview results

Analysis of the expert interviews resulted in findings organized across seven themes: (1) overall structure and content, (2) language and terminology, (3) matrix layout and visual design, (4) population diagram, (5) filters, (6) practical aspects and navigation, and (7) accessibility.

Overall, experts perceived the original version of the tool as containing several important limitations in terms of usability and accessibility. A substantial number of improvements were suggested to enhance clarity, reduce complexity, and better align the tool with patients' needs. Most concerns related to the complexity of the presented information, the use of technical language, and the visual and structural design of the tool.

1. Overall Structure and Content

Experts questioned whether patients needed all the information currently included in the tool, noting that its extensive nature risked overwhelming users. It was suggested that the content should be made more selective and patient-centred, for example by categorizing patients to allow for a more tailored presentation of relevant information, and by removing certain outcomes, treatment options, or sections that were considered less essential.

The FAQ section received particular criticism. Experts considered it not relevant for patients in its current form, and recommended either removing it entirely or fundamentally revising its content and structure. The order of items within the FAQ was described as illogical, and the recommendations section was considered unclear. Removal of the recommendations section was therefore also suggested.

2. Language and Terminology

Language was identified as a major area of concern. Several terms used throughout the tool were considered too difficult for patients without a medical background. The word "bewegingsapparaat" (ENG: musculoskeletal system) was flagged as too technical, and experts suggested replacing it with the simpler phrase "spieren, pezen en botten" (ENG: muscles, tendons and bones) The term "meta-analysis" was similarly seen as inaccessible, and a plain-language alternative was proposed, such as "a scientific study that bundles the results of existing studies". The phrase "scientific proof" was also considered potentially confusing and its removal or replacement was recommended.

The FAQ section was noted to contain many words that were too difficult for patients, and experts recommended rephrasing it to improve readability. The first sentence on the starting screen was also considered unclear and in need of revision. More broadly, sentences throughout the tool were seen as too long, and experts suggested aiming for a maximum of approximately ten words per sentence. To support comprehension, the addition of a glossary and the use of pop-ups providing additional explanations were recommended.

3. Matrix Layout and Visual Design

The matrix layout was described as too difficult to comprehend for some users, and the starting screen was considered to contain too many numbers. Experts recommended replacing numerical information with icons or other visual representations where possible and adding more graphic images throughout the tool to improve intuitive understanding. A different overall layout was suggested, with a clearer visual hierarchy to help users find relevant information more easily.
The colours used in the matrix were described as not logical or intuitive, and the legend explaining the colour coding was considered unclear. Experts recommended adapting the colours to make them more meaningful, rephrasing the colour explanations, and incorporating more visual aids and images throughout the tool.

Experts suggested to remove the explanation and numbers to describe the level of certainty. The checkmarks were seen as more intuitive, only this visual presentation should be preserved. A minor formatting issue was also noted: The title was found to contain two capital letters, and it was recommended to fix this.

4. Population Diagram

The population diagram was identified as an area requiring significant revision. Experts noted that it contained too many icons, making it difficult to interpret at a glance. The colours of the icons were described as not matching their intended meaning, and it was recommended to use green icons for positive effects and red icons for negative effects to improve intuitive interpretation. Experts noted that the current presentation next to the population diagram sometimes described odds ratios and sometimes mean differences. This was experienced as inconsistent and confusing. It was suggested to create uniformity.

Confidence intervals were considered to add complexity without clear added value for patients, so their removal was advised. The explanatory text surrounding the diagram was similarly seen as unnecessary, and experts suggested removing it to reduce cognitive load. To make the diagram more concrete and easier to interpret, a smaller format — such as a 10×10 icon array — was recommended. Finally, greater visual uniformity across the diagram was suggested to improve overall clarity.

5. Filters

Experts noted that some of the existing filters were not relevant for clinical practice, and that treatment options were currently displayed in a random order without a clear structure or ranking. Several improvements were proposed. Adding a small button or cross to allow users to remove individual treatment options was suggested as a way to give users more control over the displayed content. The ability to filter by medication versus non-medication treatments was considered a useful addition, as was limiting the display to treatment options with sufficient evidence. Providing a rating or ranking of treatment options was also recommended to help users navigate the available options more effectively.

6. Practical Aspects and Navigation

The practical aspects section was considered to contain important and relevant information, but its current presentation was seen as problematic. The section was difficult to find, requiring users to click a button and then scroll, and sentences within it were considered too long. Experts recommended integrating the practical aspects directly into the main table, making the content immediately visible when the relevant button is clicked, and simplifying the text by removing unnecessary information and keeping sentences concise.

7. Accessibility

Accessibility was raised as an important concern. The font size was considered too small for some users, and experts recommended either increasing the default font size or providing a zoom function. The addition of a voice-over feature was also suggested to improve accessibility for patients who are blind or have limited HL.

The tool was noted to function well only on a computer, and experts emphasized the importance of ensuring compatibility with smartphones and tablets. The provision of a printable version was also recommended for patients who prefer or require a paper-based format. Navigation within the tool was described as unclear in several respects, and it was suggested that it should be made more explicit where users need to click to find specific information.

Phase 2: changes implemented in the tool

Following discussion with a graphic designer, a selection of the experts' comments was implemented in a revised version of the tool. Overall, only a selection (approximately one-third to half) of the suggested changes could be incorporated, as the feasibility of adaptations was largely determined by practical and technical constraints related to the existing IT infrastructure of the tool. Changes that required fundamental modifications to the layout or underlying architecture (such as redesigning the matrix structure, creating pop-ups or optimising the tool for smartphone use, or adding a voice-over function) could not be implemented within the current version.

The changes that were carried out were primarily linguistic and visual in nature. Several medical terms were replaced by simpler alternatives — for example, *"musculoskeletal injuries"* was replaced by *"injuries to the bones, tendons, muscles and joints"*. Confidence intervals were removed from the matrix, and the colours of the pictograms in the population diagram were adjusted to better reflect their meaning. One filter (“filter by recommendations”) was removed. The practical aspects section was simplified by shortening sentences, removing irrelevant content, and deleting entire subsections that were considered of limited value. Finally, the order of the FAQ was reorganized to improve logical flow. A full overview of all implemented changes is provided in Appendix 9.

Phase 3: user-testing with individuals with limited health literacy

Participant characteristics

During the second phase of the study we interviewed 10 patients, that had presented with acute MSP and that had used the study tool with their physician during the consultation. These interviews took place between January 2025 and January 2026. Patient characteristics of participating patients can be found in Table 2.

Characteristic	**N (%) / Mean (range)**
Gender	
Female	6 (60%)
Male	4 (40%)
Age (years)	
Mean (range)	44.4 (18–65)
18–30 years	2 (20%)
31–50 years	3 (30%)
51–70 years	5 (50%)
Health literacy score (HLQ, 0–14)	
Mean (range)	11.3 (9–14)
≤10	3 (30%)
11–12	4 (40%)
13–14	3 (30%)

Table 2: Patient characteristics.

Interview results

Analysis of the ten patient interviews resulted in three overarching themes: (1) the SDM-process and integration of the tool, (2) language and comprehensibility, and (3) layout, design, accessibility, and digital functionality. A substantial number of comments did not relate to the tool itself, but rather to the broader SDM-process and the way the tool was integrated within the clinical consultation. A substantial number of comments did not relate directly to the tool itself, but rather to the broader SDM-process and the way the tool was integrated within the clinical consultation.

1. The Shared Decision-Making Process and Integration of the Tool

Patients reported mixed experiences regarding the role of the MATCH-IT tool in supporting SDM. While the tool aimed to facilitate patient involvement, several participants felt that the physician ultimately made the final decision, resulting in a limited sense of active participation. In contrast, other patients explicitly preferred a physician-led approach, expressing trust in the clinician's expertise and little desire to be more actively involved. This variation in experiences was explicitly described by participants, with some indicating that they preferred to rely on the physician's judgement, while others expressed a desire to be more actively involved in decision making. Some participants suggested that the use of the tool could be adapted depending on the patient's willingness to engage, and that physicians could take this into account during the consultation.

The concept of SDM appeared to be unfamiliar to some participants. During the interviews, several participants indicated that they were unsure about what was expected from them during the consultation, or explicitly stated that they were not accustomed to being involved in medical decision making. Some participants described that they mainly listened to the physician or waited for a recommendation, rather than actively interacting with the tool or expressing their own preferences.

Participants suggested that physicians should receive adequate training in using the tool and in guiding patients through the SDM-process in a way that feels natural and non-threatening.

The timing of tool introduction also seemed to influence patient experiences. When the tool was only presented at the end of the consultation, patients felt they had missed opportunities to be involved earlier in the process. Participants therefore emphasized the importance of introducing the tool at an earlier stage and using it in a more interactive and stepwise way throughout the consultation, starting from the patient's own preferences or treatment goals and progressively narrowing down the options.

Patients also indicated that the tool did not sufficiently take into account individual factors such as medical history, allergies, drug interactions, and contraindications — elements that were considered essential when evaluating treatment options. Several participants stressed the importance of active physician guidance to tailor the tool to each individual patient context. Some even suggested that, in certain situations, the tool might be better used by the physician alone, without directly exposing patients to information they might find confusing or overwhelming.

2. Language and Comprehensibility

A recurring finding was that many patients had difficulty understanding the language used in the tool. Medical terms such as opioids, NSAIDs, TENS, and placebo were experienced as too technical. In some cases, unfamiliar terminology led to active misinterpretation. For example, one patient believed that a placebo was a treatment used to mislead psychiatric patients, which made it difficult to correctly interpret the comparative data presented in the tool. To address this, participants suggested including explicit explanations of key concepts within the tool, for example through tooltips, hovercards, or dedicated explanatory sections for each treatment option written in plain language.

Numerical information also proved difficult to understand. Expressions such as "227 more", used to describe treatment outcomes relative to placebo, were experienced as abstract and hard to interpret. Participants suggested that presenting absolute numbers rather than relative differences would be easier to understand, and that additional explanatory pop-ups or tooltips could help clarify the meaning of such data.

The use of placebo as a reference point was a broader source of confusion throughout the tool and was raised by multiple participants across different sections. Several patients suggested that placebo comparisons should be avoided or fundamentally reconsidered, as they added to confusion rather than supporting understanding. Where comparisons were retained, it was suggested that absolute numbers should be used instead of relative expressions.

Several outcomes presented in the tool — such as nerve-related side effects, short- versus long-term symptom relief, and physical functioning — were also perceived as vague or overlapping, which reduced their interpretability. Participants suggested simplifying or merging overlapping outcome categories to improve clarity and reduce redundancy.

Finally, participants noted that parts of the Dutch version of the tool still contained untranslated English text, which reduced clarity and created an inconsistent user experience. It was suggested that all sections of the tool should be fully available in the chosen language to ensure a consistent and clear experience for all users.

3. Layout, Design, Accessibility, and Digital Functionality

The visual design of the tool was frequently described as too complex and difficult to navigate. The matrix layout — presenting multiple treatment options alongside a range of outcomes — was hard to read for many participants, and the relationship between rows and columns was not always immediately clear. Some participants felt that switching the orientation of the table — for example, displaying treatment options vertically and outcomes horizontally — might improve clarity. More broadly, participants suggested exploring alternative formats, such as a guided stepwise interface or a mind-map structure, which would lead users through the options in a more intuitive way.

The large number of treatment options shown at once, combined with extensive numerical data, led to a feeling of information overload. Participants suggested reducing the number of displayed options by removing treatments with low-quality evidence, or by providing a filter to exclude these. Grouping similar treatments together — for example, combining different paracetamol-based options — was also recommended to improve overview and reduce complexity. Replacing numerical data with more intuitive visual representations, such as pictograms or icons, was seen as a way to further reduce cognitive load.

The use of colour and visual elements caused additional confusion. Multiple shades of grey were difficult to distinguish, and the meaning of the colour coding was not self-evident to most participants. Although an expandable legend was available, participants found it inconvenient to repeatedly open and close it and suggested that keeping it permanently visible alongside the table would improve usability. Symbols such as checkmarks were also frequently misunderstood — many patients assumed they indicated treatment effectiveness, rather than the certainty of the underlying evidence.

Additional explanations were therefore recommended to ensure that such symbols are correctly interpreted.

The filtering functionality received particular criticism. Filters — for example, those allowing users to distinguish between pharmacological and non-pharmacological treatments, or to filter by level of certainty — were described as unclear, illogical, or not functioning as expected. Participants indicated that they could not easily filter treatment options based on specific concerns, such as particular side effects like gastrointestinal or skin-related effects. It was suggested that filters should be made more intuitive and fully functional, potentially with the involvement of a graphic designer, and that more flexible filtering options should be added to allow users to tailor the overview to their own needs.

The population diagram presented similar challenges. Confidence intervals were experienced as difficult to understand and of limited added value, and their removal was suggested as a way to simplify the diagram. The use of a population size of 1,000 was seen as too large and abstract, and participants suggested that a smaller and more concrete scale — such as a 10×10 icon array — would be easier to interpret. As noted in the previous theme, the comparison with placebo in the diagram was also a source of confusion, and its removal was recommended here as well.

Navigation within the tool was experienced as unclear in several respects. Several category titles were perceived as vague or insufficiently descriptive, making it difficult for participants to understand what information each section contained. Participants proposed more specific and intuitive labels — for example, renaming "Emotional well-being" to "Risk of addiction or dependence", "Food and drinks" to "Method of administration", "Travel and driving" to "Operation of vehicles and heavy machinery", and "Coordination of care" to "Follow-up of treatment and the role of the GP". It was also suggested that the category "Work and education" could be integrated into the renamed "Operation of vehicles and heavy machinery" section.

Some icons appeared interactive but could not be clicked, which caused confusion among participants. It was recommended that these light grey icons should either be removed or supported with additional information to clarify their function. The practical aspects section was considered relevant in content, but difficult to find, as accessing it required additional scrolling and clicking that was not immediately obvious. Participants suggested integrating this information more directly into the main matrix to improve its visibility and ease of use during consultations.

Finally, broader accessibility barriers were identified. The tool was perceived as less suitable for patients with limited digital skills, and older adults in particular were seen as a group at risk of being excluded. The lack of optimisation for smartphones was identified as an important limitation, given the widespread use of mobile devices in everyday life. Improving smartphone compatibility and making the interface more accessible for users with limited digital literacy were therefore identified as important priorities for future development.

Discussion

Summary of main findings

The aim of this study was to assess the inclusivity of the tool and to identify opportunities for improvement in order to optimise its accessibility and usability for individuals with limited HL. The findings from both expert interviews and patient user-testing highlight several important challenges and opportunities in designing inclusive decision-support tools.

Overall, the MATCH-IT tool was perceived as comprehensive but complex, with substantial barriers related to usability, understandability, and accessibility. Across both study phases, recurring issues included information overload, complex language, non-intuitive visual design, and difficulties interpreting numerical data and comparative formats.

Importantly, user-testing revealed that the use of the tool did not automatically result in meaningful SDM. While some patients appreciated involvement, others reported limited perceived participation or a preference for a physician-led approach, indicating that SDM tools alone are insufficient without appropriate integration into the consultation process.

Comparison to existing literature

The role of decision aids in shared decision making

A particularly relevant finding is that the presence of an SDM tool did not guarantee actual SDM. Several patients reported that decisions were still largely physician-driven, while others explicitly preferred this approach. However, this preference should be interpreted with caution, as it may partly reflect patients' unfamiliarity with SDM and with their potential role in the decision-making process, rather than a stable preference for a passive decisional role.

This reflects the well-documented variability in patient preferences for involvement in decision making. [25] It also highlights that SDM should be viewed as a flexible, preference-sensitive process, rather than a one-size-fits-all model. [3, 26]

In addition, patients' unfamiliarity with SDM suggests that tools need to be embedded within a broader communication strategy, including clinician training and explicit explanation of patient roles. Without this, tools risk becoming informational rather than participatory. [3, 26]

Patients emphasised the lack of individualised information, particularly regarding contraindications, side effects, and personal medical history. This reflects a key limitation of many decision aids: the difficulty of balancing evidence-based general information with patient-specific applicability. [3, 27]

These findings suggest that SDM tools such as MATCH-IT should be used as supportive instruments within a clinician-guided process, rather than standalone tools. Personalisation by the clinician remains essential to ensure clinical relevance and patient trust. [28]

Health literacy and comprehensibility of decision aids

The findings of this study reconfirm that many patient decision aids (PtDAs) are insufficiently adapted to individuals with limited HL. [27] Similar to earlier studies, participants in this study experienced difficulties with medical terminology, abstract concepts (e.g., placebo), and numerical risk communication. [5-7, 10]

The observed challenges with interpreting expressions such as "X more than placebo" and population diagrams confirm prior evidence that relative and comparative risk formats are difficult to understand, particularly for individuals with lower HL. [7, 10] This supports existing recommendations to prioritise absolute risks, simplified formats, and visual aids such as icon arrays. [8-10, 29]

Interestingly, even visual elements—often proposed as solutions for low HL—were not inherently effective. Poorly designed graphics, unclear colour coding, and overly large population diagrams introduced additional confusion. This underscores that visualisation alone is not sufficient; design must be intuitive, minimalistic, and user-tested.[29]

Information overload and cognitive burden

A key finding was the tension between completeness and usability. While the MATCH-IT tool aimed to provide a comprehensive overview of treatment options and outcomes, both experts and patients reported cognitive overload due to the volume of information.

This finding is consistent with literature on decision aids, which shows that excessive information (information overload) can hinder decision making, particularly in individuals with limited HL. The results support the use of layered information and progressive disclosure, where essential information is presented first, with optional access to more detailed content. [8]

Strengths and limitations

Strengths

This study has several important strengths. First, it employed a user-centred, iterative design, incorporating both expert evaluation and real-world patient testing. This approach is strongly aligned with international recommendations for the development of decision aids (IPDAS). [12, 30]

Secondly, the study evaluated the tool in the context of actual clinical consultations, enhancing ecological validity and providing insights into real-life use.

Thirdly, the use of a theoretical framework (Morville's Honeycomb model) provided a structured approach to evaluating user experience across multiple dimensions. [31]

Limitations

Several limitations should be considered.

First, the study relied on convenience sampling and included a relatively small sample of patients, which may limit generalisability. Nevertheless, data collection continued until thematic data saturation was approached, with recurring patterns observed across participants, supporting the credibility of the findings despite the modest sample size.

Second, although the study aimed to include individuals with limited HL, participants generally demonstrated moderate to high HL levels. This limits the extent to which conclusions can be drawn for the primary target population. A possible explanation for the difficult recruitment of the target group, could be the so-called participation paradox. This concept refers to the phenomenon whereby those who are most likely to benefit from research—such as individuals with lower HL or from more vulnerable socio-economic backgrounds—are often the least likely to participate. As a result, research samples tend to be dominated by a more advantaged subgroup, while the perspectives of those most in need of the intervention remain underrepresented. This is particularly relevant given that the tool is specifically intended to support individuals with lower HL, which may limit the applicability of the findings to the population the tool is intended to support.

Third, both main researchers conducted the patient consultations, introducing a potential risk of bias due to their dual role as clinician and researcher. In addition, the researchers had not received formal training in communication skills specific to SDM. Although a structured step-by-step guide for using the decision aid was available, including suggested phrasing and communication strategies, this cannot be considered equivalent to formal SDM training. As such, variation in how the tool was applied in practice is likely. This limitation is important in light of the study findings, which indicate that effective SDM requires more than the mere use of a decision aid, and depends strongly on communication skills and patient engagement.

Efforts were made to enhance consistency through the use of interview guides and, where feasible, independent coding and consensus discussions. The researchers' limited prior experience in qualitative research may also have influenced the analysis, although this was partly mitigated by the involvement of more experienced team members.

Fourth, approximately one-third to half of the suggested improvements were implemented. These mainly concerned linguistic simplifications, visual refinements, and the reduction of redundant content. In contrast, more complex or resource-intensive adaptations—such as restructuring the matrix layout, enhancing interactivity, or improving accessibility features—were not incorporated due to technical constraints. This may partly explain why several limitations of the tool persisted, as identified by both patients and experts in the present study.

Finally, the researchers were not involved in the development of the MATCH-IT tool. However, the study supervisor was affiliated with the organisation responsible for its development.

Implications for clinical practice and future research

The findings of this study have several implications for clinical practice. First, they highlight the need for substantial simplification of SDM tools, including the use of clear language, reduced information load, and intuitive visual design, in order to improve accessibility, particularly for patients with limited HL.

Second, the findings emphasise that the effectiveness of such tools not only depends on their content, but also on how they are used within the clinical encounter. This supports the need to embed decision aids within a broader communication strategy, including clinician training and explicit clarification of the patient's role in the decision-making process. In addition, previous research suggests that incorporating an initial "step 0" in the SDM-process—focusing on shared problem understanding or "goal talk"—may be particularly beneficial for patients with limited HL, as it helps to clarify to individuals with limited HL what their problem or diagnosis is they are going to make a decision about.[32, 33]

Third, the study highlights that the current version of the tool only reflects a partial integration of expert feedback. As described in the results, a substantial proportion of suggested modifications—particularly those requiring structural or technical changes—could not be implemented. This may have contributed to the limitations identified by both patients and experts. Future iterations of the tool should therefore prioritise the integration of these previously unimplemented modifications.

Future research should prioritise evaluation in populations with limited HL, as well as assess the impact of the tool on outcomes such as decisional conflict, patient satisfaction, and clinical decision quality. In addition, future research could explore opportunities for digital optimisation and more advanced forms of personalisation, for example through the use of artificial intelligence to tailor content and presentation to individual patient characteristics, preferences, and levels of HL.

Conclusion

The MATCH-IT tool represents a promising approach to support SDM in acute MSP. However, this study demonstrates that substantial challenges remain in ensuring accessibility and usability, particularly for individuals with limited HL.

While iterative refinement based on expert and patient input led to improvements, only a subset of expert feedback could be implemented in the current version of the tool, mainly due to technical and practical constraints. As a result, several important barriers—including information overload, complex language, and limited personalisation—persisted. Moreover, the use of a decision aid alone did not guarantee meaningful patient involvement in decision making.

These findings underline that effective implementation of SDM requires not only well-designed tools, but also their integration within a broader communication approach, including active clinician engagement and clear guidance of the decision-making process. Future efforts should therefore focus on further iterative development, prioritise the integration of these previously unimplemented modifications , alongside simplification, improved integration into clinical workflows, and targeted evaluation in populations with limited HL.

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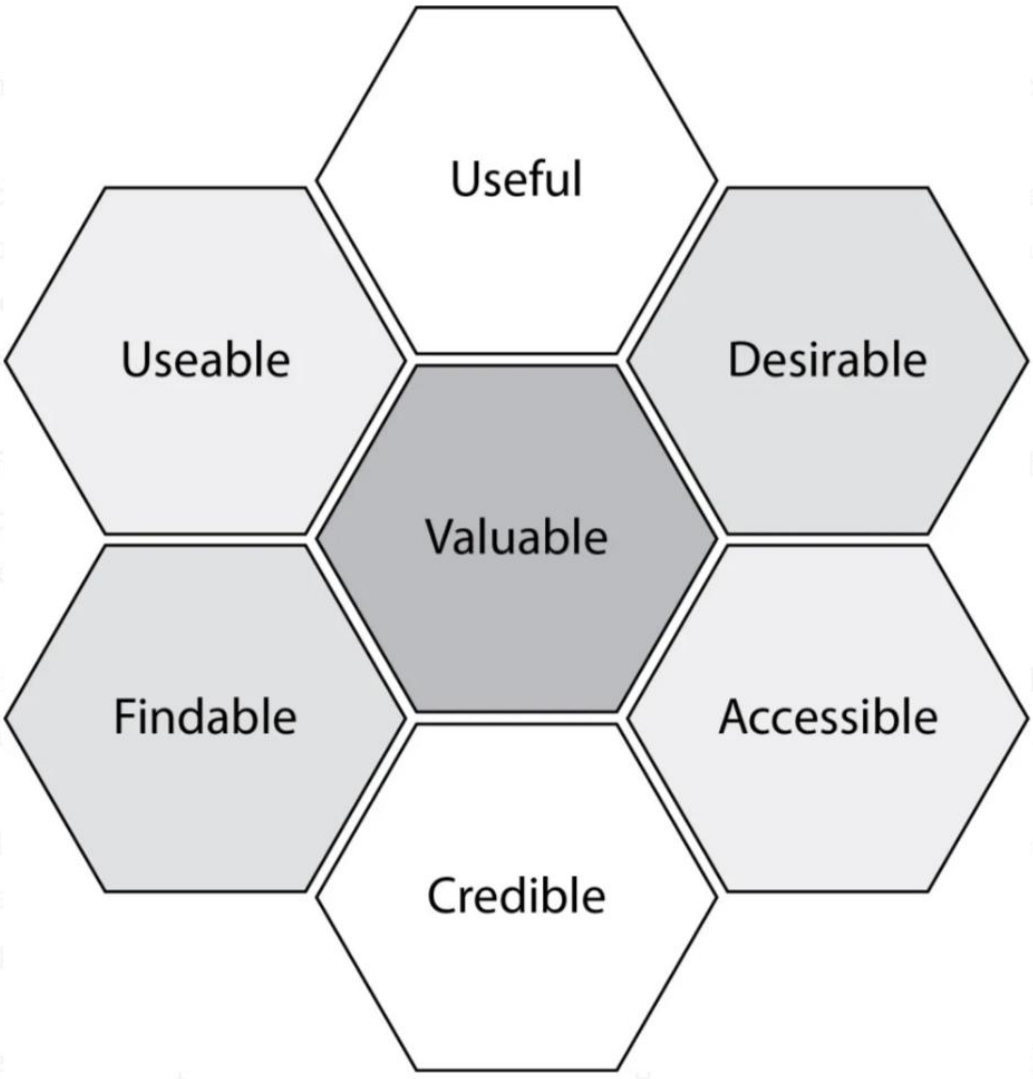
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Appendices

Appendix 1: Morville's honeycomb



Appendix 2: Approval Ethics Committee

Leuven, 05 Dec 2024

Ethics Committee
Research UZ/KU Leuven
UZ Leuven
Herestraat 49
B 3000 Leuven (Belgium)
Tel +32 16 34 86 00
Email : ec@uzleuven.be

prof. dr. Nicolas Delvaux

Our reference:	EudraCT-nr:	Belg. Regnr:
S68512		B3222024001569

Making Alternative Treatment CHoices Intuitive and Trustworthy (MATCH-IT) for patients.

Positive advice in accordance with the law of 7 May 2004 on experiments on the human person

Dear colleague

The Ethics Committee Research (EC Research) UZ/KU Leuven has examined and discussed the above mentioned dossier in the meeting held on 04 Nov 2024.

After having consulted the additional information and/or adapted documents relating to this dossier, EC Research considers that the proposed study, as described in the protocol, is scientifically relevant and ethically justified. After consulting the Ethics Committee of the other participating centres, it therefore gives on 05 Dec 2024 a favourable opinion on this study.

EC Research emphasizes the responsibility of the PI/promotor of this study concerning the privacy of the participants'/patients' data. Additionally, all access to patient data by students or coworkers should occur under the responsibility and supervision of the PI/promotor (including the use of personal data in electronic/digital tools). The PI/promotor is responsible for the implementation of the project proposal in accordance with applicable laws and regulations including, but not limited to, the EU regulation 2016/679 (General Data Protection Regulation), the Belgian Law on patients' rights of 22/8/2002, and the policy of the institution where the research will be carried out.
EC Research refers to the ICH/GCP guidelines on its website, and confirms that a GCP-training is required for each investigator. It is the responsibility of the principal investigator that each member of the study team has a valid GCP-certificate(i.e. a certificate obtained not longer than 3 years ago).

EC Research underlines the sponsor's responsibility for the use of the application/digital tool in this clinical study. More specifically, the sponsor should conduct all essential GDPR checks to make sure the use of this application/tool is justified, GDPR compliant

and safe for the processing of sensitive personal data.
The patient should be well informed about the terms, conditions and costs of application. Furthermore, the sponsor's obligations should not be compromised by these terms and conditions, especially in terms of privacy protection of the patient. Please inform the patient about additional costs (if any) that are linked to the usage of the application/tool. This information should be added to an updated ICF, if necessary, in a subsequent amendment to the study.
Finally, EC research emphasizes that only essential data for the purpose of the application/tool can be collected (cf. GDPR principle of data proportionality and minimization).

For the assessment of this dossier, documents/answers received on 15 Oct 2024, 25 Oct 2024 , 26 Nov 2024, 03 Dec 2024 and 04 Dec 2024 have been taken into account.

The favourable advice concerns:

Protocol:
versie 3 dd 03Dec2024
Informed Consent Form:
ICF patients v2 dd 26Nov2023 NI
ICF Experts versie 2 dd 04Dec2024
Other subject information documentation:
Interviewguide patients versie 1 dd 03Dec2024
Interviewguide experts versie 1 dd 03Dec2024
Recruitment material:
recruitment material patients versie 1 dd 23Oct2024
recruitment material experts versie 1 dd 03Dec2024
GDPR questionnaire:
dd 23Nov2024
PRET dd 28Nov2024

EC Research confirms working in accordance with the ICH-GCP principles (International Conference on Harmonization Guidelines on Good Clinical Practice), the latest version of the Declaration of Helsinki, the Oviedo Convention on Human Rights and Biomedicine and applicable laws and regulations.

EC Research confirms that members with a potential conflict of interest abstain from voting.

List of members: see appendix.

Points of concern: (if applicable)

The conformity of translated documents compared to the Dutch documents, is the responsibility of the sponsor.

We would like to draw your attention to the fact that EC Research expects her initial comments to be taken into account ab initio at the next submission by the same sponsor.

*Provided that there is a **Clinical Trial Agreement**, the study can only start when the Clinical Trial Agreement has been approved and signed by the CEO of UZ Leuven (and/or by an authorized representative of KU Leuven R&D).*

Please take into account the regulations of the hospital concerning tissue management and the regulations of the law of December 19, 2008.

It is important to note that approval from EC Research is required for all use of e-consent before the process can start. This is a crucial step to ensure that all ethical considerations and regulations are adhered to. For more detailed information regarding the policy and procedure concerning e-consent in REDCap, we kindly refer you to the specific page on the CTC Datamanagement website: https://gbiomed.kuleuven.be/english/ctc/intern/data-management/econsent

This favourable advice from EC Research does not imply that EC Research can be held accountable for the planned study. You will remain responsible for the study. In addition, you should ensure that your opinion as principal investigator is reproduced in publications of study results, reports for the government, etc.

The EC approval granted for a specific project, is valid for one year.

If the study will not be terminated within a year, the ICH-GCP demands that an annual progress report will be provided to EC Research. We also request you to inform us if the study will not be initiated or if the study does not start within 1 year after approval.

Finally, the termination (early or planned) of the study should be reported within the legal deadlines.

Yours sincerely,



Prof. Dr. Minne Casteels
Chair
Ethics Committee Research UZ Leuven

Cc:
FAMHP (Federal Agency for Medicines and Health Products)

CTC (Clinical Trial Center UZ Leuven)

EXTERNAL Committees :

1. EC Research has taken into account the opinion of the following local committees (s). EC Research therefore assumes that these centres will accept the study, unless otherwise notified

Local Committee	*Principal investigator*	*Date advice*

2. The following committee(s) has (have) issued a negative opinion:

   Local Committee *Principal investigator*

3. EC Research did not receive any advice from the committee(s) below. Consequently, these centres cannot participate in this study (cf. Law of 7 May 2004). These centres can only be added to the study by a substantial amendment.

   Local Committee *Principal investigator*

4. EC Research received the advice of the local committee(s) below too late (i.e. after sending out the first remark letter). Consequently, these centres cannot participate in this study (cf. Law of 7 May 2004). These centres can only be added to the study by a substantial amendment.

   Local Committee *Principal investigator*

List of members EC Research UZ/KU Leuven

Chair	prof. dr. Maria-Reinhilde Casteels	Clinical Pharmacology
Vice chair	prof. dr. Dominique Bullens	Paediatrics
	De heer Aernout De Raemaeker	Medical Legislation alternate
	De heer Jean-Jacques Derèze	Medical Legislation alternate
	De heer Mathijs Swaak	Healthy volunteer repres.
	Mevr. Annick Vanclooster	Nurse
	Mevr. Dorien Fierens	Medical Legislation alternate
	Mevr. Katelijne Van Overwalle	Pt representative (alternate)
	Mevr. Lia De Wilde	Pt representative (alternate)
	Mevr. Marie Gilliot	Medical Legislation alternat
	Mevr. Marilien Vandeputte	Nurse
	Mevr. Teresia De Fraye	Pt representative
	Mevr. Valerie Christens	Medical Legislation alternat
	Mevr. Veerle Vanparys	Pharmacist (alternate)
	dr. Ellen Deleus	Abdominal surgery
	dr. Heleen Delbeke	Ophtalmology
	dr. Kamiel Verbeke	Clin. Psychology
	dr. Kristel Van Landuyt	Bioband
	dr. Lut De Groote	General Practitioner
	dr. Marleen Renard	Paediatrics
	dr. Walter Janssens	Clinical Pharmacology
	prof. André Loeckx	Pt representative (alternate)
	prof. Ben Van Calster	Statistics
	prof. Guy Bosmans	Clin. Psychology (alternate)
	prof. Kristin Verbeke	TARGID
	prof. Pascal Borry	Ethics (alternate)
	prof. Rik Gosselink	Revalidation
	prof. dr. Anne Smits	Paediatrics
	prof. dr. Anne Uyttebroeck	Paediatrics
	prof. dr. Ariel Alonso	Statistics (alternate)
	prof. dr. Bart Van der Schueren	Endocrinology / Pharmacology
	prof. dr. Catherine Cassiman	Ophthalmology
	prof. dr. Francesca Bosisio	Pathology
	prof. dr. Frank Van Calenbergh	Neurosurgery
	prof. dr. Frederik Nevens	Hepatholgy
	prof. dr. Gregor Verhoef	Haematology
	prof. dr. Jan Verhaegen	Laboratory Medicine
	prof. dr. Jan de Hoon	Clinical Pharmacology
	prof. dr. Karin Sipido	Experimental Cardiology
	prof. dr. Koen Luyckx	Clin. Psychology (alternate)
	prof. dr. Laura Van Gerven	ORL
	prof. dr. Maria Schetz	Intensive care
	prof. dr. Peter Sinnaeve	Cardiology
	prof. dr. Simon Brumagne	Physiotherapy
	prof. dr. apr. Erwin Dreesen	Pharmacist

Appendix 3: Interview guide for expert interviews, in Dutch and English respectively

Dutch version

Hieronder zijn een aantal vragen geformuleerd die een leidraad kunnen zijn bij het doornemen en evalueren van de beslishulp. Tijdens dit interview testen we de beslishulp, en niet de geïnterviewde. Dit wil zeggen dat er geen juiste/foute antwoorden zijn. Als er bepaalde dingen zijn die je verwarrend/duidelijk/makkelijk/moeilijk/… vindt, dan weten we dit graag.

- Wat was je eerste reactie bij het doornemen van de beslishulp? En wat was je algemene idee over de bruikbaarheid van de beslishulp?
- Denk je dat de tool gemakkelijk te gebruiken is door patiënten met een lage gezondheidsgeletterdheid? Welke aanpassingen zouden we kunnen maken om de tool meer gebruiksvriendelijk te maken?
- Is er informatie die ontbreekt?
- Is er informatie overbodig?
- Is de volgorde waarin informatie wordt aangereikt duidelijk en logisch?
- Heb je nog suggesties om dit interview zelf te kunnen verbeteren?

We zullen tijdens dit interview niet ingaan op alle facetten van de Honeycomb, maar zullen focussen op de bruikbaarheid van de tool.

Belangrijk is dat de focus van het interview op de tool blijft liggen, en niet op gezondheidsvaardigheden in het algemeen. Algemene opmerkingen/suggesties kunnen nadien zeker ook nog gemaakt worden.

English version

These questions are a guideline for using and evaluating the decision aid. You can base your evaluation on these questions. During this interview we will test the decision aid, not you. This means that there are no wrong of right answers. If there are certain things you find confusion/clear/easy/hard/…., we would like to know.

- What was your first reaction when using the decision aid? What was your general idea about the usability of the decision aid?
- Do you think that the tool will be easy to use by people with low health literacy? Which changes could we make to improve the usability of the tool?
- Is there information lacking?
- Is there unnecessary information?
- Is the order in which the information is handed to the patient clear and logical?
- Do you have any suggestions to improve the interview process?

We won't explore all the Honeycomb facets during this interview, but we will focus on the usability.

We will go through the decision aid together, and during this you can make suggestions to improve the tool. It is important that the focus will be on the tool, and not health literacy in general. General comments/suggestions can certainly be made after the interview.

Appendix 4: The Health Literacy Questionnaire (2014)

The Health literacy questionnaire is a measurement tool developed in 2014, and tries to objectify health literacy in different areas.[34] This questionnaire has a good reliability and validity to question health literacy.[35]

This questionnaire test health literacy on nine domains by 44 questions.[34] The nine domains are listed underneath:

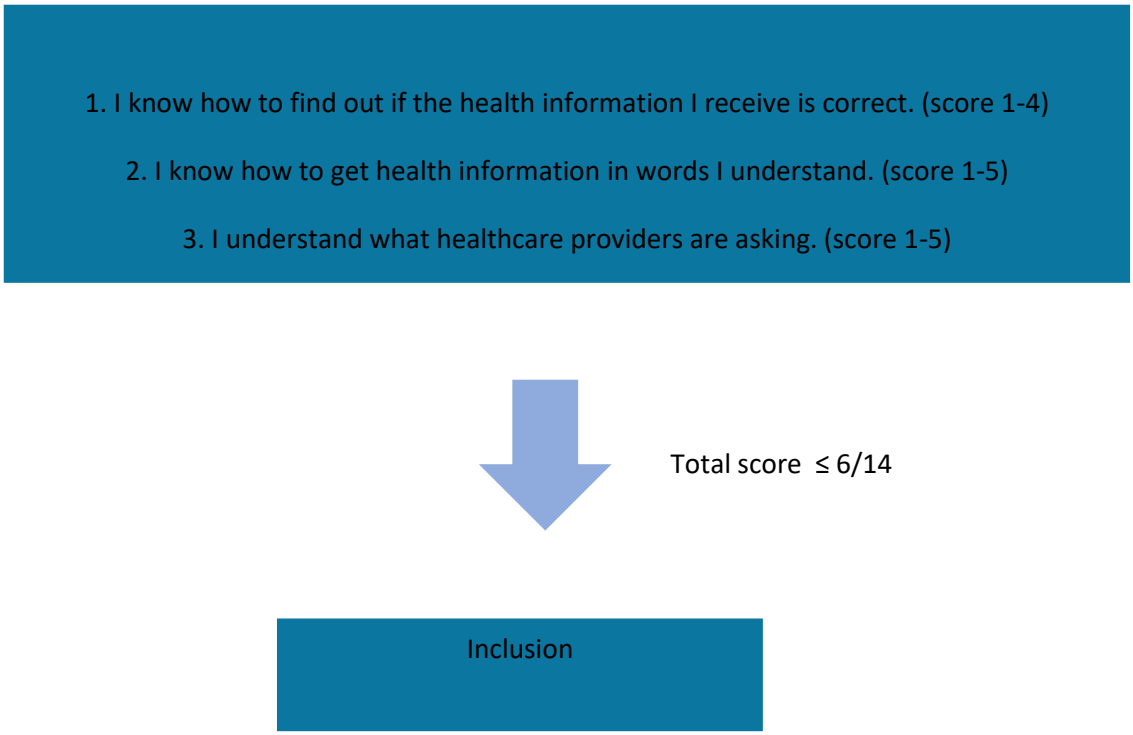
1. Feeling understood and supported by health care providers.
2. Having sufficient information to manage my health.
3. Actively managing my health.
4. Social support for health.
5. Appraisal of health information.
6. Ability to actively engage with health care providers.
7. Navigating the health system.
8. Ability to find good quality-health information.
9. Understanding health information well enough to know what to do.

Appendix 5: Overview of HL measurement tools available in Dutch, with advantages and disadvantages respectively

Questionnaire	Advantages	Disadvantages
Health literacy questionnaire (2014)	- takes a broad look at HL - can be administered in writing - a researcher involved in this thesis already has experience with this questionnaire	- there are a lot of questions, therefore administering the questionnaire can take a lot of time - you have to ask permission to use the questionnaire - translation of the questionnaire has to go according to protocol
Health literacy Survey Europe (HLS-EU-Q)	- takes a broad look at HL (several dimensions). - the questionnaire is used and studied a lot	- there are a lot of questions, it is difficult to use the questionnaire efficiently
e-Health Literacy Scale (E-HEALS)	- contains only eight questions, use of the questionnaire is efficient - assesses e-literacy, which is relevant for this research	- only assesses e-literacy, and no other aspect of HL
FCCHL	- easy to use by patient - contains only 14 questions which makes use of the questionnaire efficient	- developed for patients with chronic diseases, can't be extrapolated to the general population

Appendix 6: Initial inclusion process

To measure health literacy, we selected 3 questions from the HLQ from the 3 domains in which people scored the lowest. These are domain 5, 8 and 9 (see appendix 3): Appraisal of health information, ability to find good quality-health information and understanding health information well enough to know what to do. The inclusion process is shown underneath



The answer to these three questions is according to a likert-scale.

For the first question the numbers means the following:

1. Strongly disagree
2. Disagree
3. Agree
4. Strongly agree

For the second and third question numbers mean the following:

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

Appendix 7: Step-by-step plan for clinicians (Dutch version)

Stappenplan user-testing MATCH-IT tool.

1. Patiënt meldt zich aan met acute musculoskeletale klachten. Bekijk na anamnese en klinisch onderzoek of de patiënt in aanmerking komt om deel te nemen aan de studie. De patiënt moet de Nederlandse taal voldoende beheersen.
2. Laat de informed consent ondertekenen.
3. Stel de 3 screeningsvragen naar gezondheidsvaardigheden:
   - Ik weet hoe ik erachter kan komen of de gezondheidsinformatie die ik krijg wel of niet klopt: score 1-4
     (1: zeer mee oneens – 2: mee oneens – 3: mee eens – 4: zeer mee eens)
   - Ik vind gezondheidsinformatie krijgen in woorden die ik begrijp: score 1-5
     (1: altijd moeilijk/ kan ik niet – 2: meestal moeilijk – 3: soms moeilijk – 4: meestal makkelijk – 5: altijd makkelijk)
   - Ik vind begrijpen wat zorgverleners me vragen te doen: score 1-5
     (1: altijd moeilijk/ kan ik niet – 2: meestal moeilijk – 3: soms moeilijk – 4: meestal makkelijk – 5: altijd makkelijk)

   Indien de score ≤6/14 kan de patiënt geïncludeerd worden in de studie.

   Er is een schriftelijke vragenlijst als visuele ondersteuning van de patiënt (zie pagina 3), de vragen moeten wel steeds mondeling gesteld worden.
4. De tool gebruiken om de meest geschikte behandeling te bepalen (voor extra info over hoe je dit best aanpakt, zie pagina 2)
5. De gegevens van de patiënt via mail doorsturen naar rebeccavaessens@gmail.com. Patiënten zullen dan binnen de 2 weken gecontacteerd worden voor een interview dat ongeveer 30 minuten duurt.

   Door te sturen gegevens:
   - naam en voornaam
   - leeftijd
   - e-mail-adres
   - telefoonnummer

Hoe gebruik ik de beslistool samen met de patiënt?

1) Ik leg aan de pt uit dat we de pijn op verschillende manieren kunnen behandelen, en nodig hem uit om de verschillende opties samen te overlopen.
(bijv. "*U heeft pijn. Die kunnen we op verschillende manieren aanpakken. Vindt u het goed dat we de verschillende opties even samen overlopen met deze tool?*")

2) Ik benadruk dat ik de inbreng van de pt belangrijk vindt, owv zijn ervaringsdeskundigheid.
("*Jij kent jezelf, en wat bij jou past, het best! Ik vind het dus belangrijk om te horen wat jij belangrijk vindt.*")

3) Je probeert inzicht te verwerven in de eerdere ervaringen en voorkeuren van de patiënt, en je voorstelling van opties hierop af te stemmen.
("*U zei daarnet dat u kiné al eerder geprobeerd had, en er weinig tevreden van was. Begrijp ik het goed dat u daarom weinig interesse heeft in het verder bespreken van deze optie, maar wel de andere opties die er zijn?*")

4) Je benadrukt voldoende het belang van vragen stellen, te meer gezien de complexiteit van de vele opties. Je creëert een ontspannen, veilige en rustige sfeer om dit te bewerkstelligen.
("*Het kan allemaal wel wat overweldigend zijn, al die opties. Stel mij gerust vragen.*" + principe van 'chunk and check' (bijv. 3 of 4 opties overlopen en tussendoor al eens afchecken of er vragen zijn ('*Welke vragen heeft u nog?*'), vooraleer je verder gaat...)

5) Je bespreekt de opties, 'tailored' tav de pt die voor je zit. Je maakt zo weinig mogelijk een selectie obv je eigen voorkeuren, maar vertrekt zoveel mogelijk vanuit de voorkeuren van de pt - en laat die als leidraad gelden voor het 'option talk' gesprek.

6) Je begeleidt mee het afwegingsproces van de patiënt, door het stellen van bijvragen tijdens het overlopen van de opties, door in te gaan op emoties die je opvangt, door parafrasering ea. (je blijft zoveel mogelijk in dialoog)

7) Je benadrukt dat het nemen van een keuze mag uitgesteld worden, dat de patiënt de opties ook nog even mag/kan laten bezinken of met anderen thuis bespreken.
etc... (niet exhaustief)

Vragenlijst om te screenen naar gezondheidsvaardigheden.

Ik weet hoe ik erachter kan komen of de gezondheidsinformatie die ik krijg wel of niet klopt.

- o zeer mee oneens
- o mee oneens
- o mee eens
- o zeer mee eens

Ik vind gezondheidsinformatie krijgen in woorden die ik begrijp

- o altijd moeilijk/ kan ik niet
- o meestal moeilijk
- o soms moeilijk
- o meestal makkelijk
- o altijd makkelijk

Ik vind begrijpen wat zorgverleners me vragen te doen

- o altijd moeilijk/ kan ik niet
- o meestal moeilijk
- o soms moeilijk
- o meestal makkelijk
- o altijd makkelijk

Appendix 8: interview guide for patient interviews

There is only a Dutch version since the native language of both main researchers is Dutch.

Interviewgids patiënten interviews

Bedankt voor jou deelname aan ons onderzoek.

Om te beginnen wil ik graag nog even verduidelijken wat we precies willen bereiken met dit onderzoek. We gaan een beslishulp bekijken. Deze heeft de bedoeling patiënten te ondersteunen bij het nemen van een beslissing in verband met een behandeling. Zo'n tool wordt dus gebruikt als er verschillende goede behandelingsopties zijn, met elk hun voor-en nadelen.

We willen ervoor zorgen dat deze tool gemakkelijk te gebruiken is, vandaar dit interview. Aan de hand van jou opmerkingen en feedback gaan we aan aantal punten oplijsten die we zouden kunnen veranderen aan de tool om deze makkelijker te gebruiken te maken.

Voor we aan het interview starten willen we nog benadrukken dat we de tool testen, en niet jou als gebruiker. Er zijn dus geen foute of juiste antwoorden op de vragen die we stellen.

- Wat was je eerste reactie bij het gebruik van de beslishulp?
- Vond je de tool over het algemeen gemakkelijk te gebruiken?
- Welke aanpassingen zouden we kunnen maken om de tool gemakkelijker te kunnen gebruiken?
- Is er informatie die je mist ?
- Is er informatie die je niet zo nuttig of overbodig vond?
- Is de volgorde waarin informatie wordt aangereikt duidelijk en logisch?
- Vond je de tool een meerwaarde? / Vond je de tool helpend?
- Zou je iets veranderen aan het uitzicht van de tool? (kleuren, grootte van het lettertype,…?)
- Heb je nog suggesties om dit interview zelf te kunnen verbeteren?

Appendix 9: Changes implemented in the tool

Listed underneath are the changes, suggested by the HL experts that were implemented in the tool after discussion with a graphic designer.

1. Deleting the confidence intervals in the matrix
2. Adapting the following words/sentences.
    - Titel: "*Welk onderdeel van de behandeling zou je als volgende willen bekijken? Kies een of meerdere gevolgen van de behandeling waarover je het wetenschappelijk bewijs wil bekijken*" → "*Welke behandeling wil je bekijken? Kies een of meerdere gevolgen van de behandeling waarover je het wetenschappelijk bewijs wil bekijken*"
    - "*acute musculoskeletale pijn"* → "*pijn aan botten, pezen, spieren en gewrichten"*
    - "*bewegingsapparaat"* → *"botten, pezen, spieren en gewrichten"* (ergens op het beeld ook een icoon toevoegen van een elleboog of een knie)
    - In the matrix: "*plus"* → *"de plus"*
3. Removing the filter "filteren op aanbeveling"
4. Population diagram: changing the colors of the pictograms to match their meaning
    - Light blue: "placebo": when you click placebo the guys that represent the placebo-effect lights up in the same colour
    - Dark blue: "effect van de behandeling" (=treatment effect): when you click "effect van de behandeling" the guys that represent this lights up in the same colour
5. Population diagram: zekerheid: the check mark stays, the explanation underneath was deleted
6. In every population diagram there were too much capital letters in the title, these were removed
7. Praktische aspecten: the sentences were too long and there is a lot of text that was not relevant
    - General adaptations : (in different topics)
      The straight text was replaced by the cursive text
        - "Met ontstekingsremmers (NSAID's) en ontstekingsremmers (NSAID's) + mentholgel op de huid aangebracht" → "*Topisch NSAID en topisch NSAID + mentholgel"*
        - "Met ontstekingsremmers (NSAID's)" → "*orale NSAID's"*
        - "Met paracetamol (pijnstiller en koortswerend)" → "*paracetamol*"
        - "Met opioïden en tramadol (sterke pijnstillers)" → *"opioïden en tramadol"*
        - *"*Met transcutane elektrische zenuwstimulatie (TENS)" → *TENS (transcutane elektrische zenuwstimulatie)"*
        - "met specifieke acupressuur" → *"specifieke acupressuur"*
    - Gebruikelijke behandeling:
        - This point was deleted entirely because it doesn't contain relevant information
    - Onderzoeken en raadplegingen
        - The piece under 'diclofenac' was be deleted
        - The parts about: lokale behandeling, paracetamol and TENS were deleted

- "Bij aandoeningen zoals hoge bloeddruk, bevestigde hart- en vaatziekte, chronische aandoening van de nieren, zijn bepaalde onderzoeken en een beoordeling door een arts nodig vóór de start van de behandeling, alsook tijdens de behandeling." → "*Bij bepaalde aandoeningen zijn er onderzoeken en beoordeling door een arts nodig vóór en tijdens de behandeling. Deze aandoeningen zijn bijvoorbeeld een hoge bloeddruk, hart-en vaatziekten en nieraandoeningen"*

· Aanpak en materiaal
  - No specific adaptations
· Het coördineren van de zorg
  - No specific adaptations
· Bijwerkingen, interacties met andere geneesmiddelen en tegengif
  - The part about 'diclofenac' was deleted
  - The sentence: "*deze informatie komt uit de bijsluiter"* was deleted for each treatment
· Emotioneel welzijn
  - No specific adaptations
· Zwangerschap en borstvoeding
  - The first point was split in two:
    - *Topisch NSAID en topisch NSAID + mentholgel*
      - *Deze geneesmiddelen mogen niet gebruikt worden in het derde trimester van de zwangerschap.*
      - *Hun gebruik in het eerste of tweede trimester van de zwangerschap wordt niet aanbevolen. Voordat men overweegt om de behandeling te starten, moet er een grondige beoordeling van de voor- en nadelen gebeuren. Die worden met de patiënt besproken.*
      - *Veilig te gebruiken tijdens de borstvoeding. De geneesmiddelen mogen niet op de borsten worden aangebracht.*
    - *Oraal NSAID*
      - *Deze geneesmiddelen mogen niet gebruikt worden in het derde trimester van de zwangerschap.*
      - *Hun gebruik in het eerste of tweede trimester van de zwangerschap wordt niet aanbevolen. Voordat men overweegt om de behandeling te starten, moet er een grondige beoordeling van de voor- en nadelen gebeuren. Die worden met de patiënt besproken.*
      - *Veilig te gebruiken tijdens de borstvoeding.*
· Kostprijs en beschikbaarheid
  - Deleted entirely
· Reizen en voertuigen besturen
  - No specific adaptations
· Voeding en dranken
  - No specific adaptations
· Werk en opleiding
  - No specific adaptations

8. The order of the FAQ was changed as following:
    - *Voor wie geldt het wetenschappelijk bewijs?*
    - *Hoe gebruik ik deze hulp?*
    - *Waar komt de zekerheid van bewijs vandaan?*
    - *Hoe worden de resultaten van de behandeling bepaald?*
    - *Wat houdt de beoordeling van het wetenschappelijk bewijs uit de studies in?*
    - *Wat is een meta-analyse?*
    - *Aanbevelingen*