Implementing a digital clinical decision support tool for side effects of antipsychotics: a focus group study

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Word count: 3335

ABSTRACT

Background

In medicine, algorithms can inform treatment decisions by combining the most up-to-date evidence about side-effect profiles of medications which are comparable in efficacy. Their use provides opportunities for improved shared clinician-patient decision-making when initiating therapy. We designed a decision support tool that incorporated the latest evidence regarding antipsychotic side-effects. The tool allowed patients to select one side-effect commonly associated with antipsychotics that they wished to avoid; the tool then provided a list of suggested medications and ones to avoid.

Objective

To explore qualitatively the acceptability and usefulness of the decision support tool from the perspectives of patients and psychiatrists.

Methods

This qualitative study took place at a mental health and community hospital in Oxford, United Kingdom, in 2018. Four patients/carers and four psychiatrists were recruited to two focus groups to explore their perceptions of the tool. Data was thematically analysed.

Findings

Findings demonstrated a high degree of acceptability and potential usability of the decision support tool for patients and psychiatrists. The main themes to emerge relating to the decision support tool were 'prescribing preferences and practices', 'consideration and awareness of side-effects', 'app content, layout and accessibility', 'influence on clinical practice' and 'role in decision-making'.

Conclusions

A proof-of-concept clinical study will incorporate the recommendations produced from the findings into the tool's design.

Clinical Implications

Digital decision support tools provide opportunities for the most up-to-date information on medication side-effects to be used as the basis for shared clinician-patient decision making. This tool has the potential to improve adherence to psychiatric medication, with benefits to clinical outcomes and healthcare resourcing.

BACKGROUND

The global prevalence and burden of psychiatric disorders worldwide is rising, yet this is not reflected by the slow pace of progress in treatment development[1]. It is imperative that all available scientific information is considered when making treatment decisions to improve patient outcomes and clinical care. Precision medicine provides patients with customised interventions that are likely to be effective, whilst having tolerable side-effect profiles[2], often informed through the development of medical algorithms[3]. Decision support tools (DSTs) are innovative technologies that can provide continuously updated information about medications to promote shared decision-making between patients and clinicians[4].

DSTs have the potential to improve adherence to medical therapies through patient decision-making, empowerment and improved awareness of potential side-effects[5]. Negative experiences of side-effects are a major reason for treatment discontinuation among patients, with up to 50% of patients reporting this as a reason for non-compliance[6]. In addition, having past experience of side-effects can lead to an aversion to future medications, including antipsychotics, resulting in poorer adherence[7].

Studies using non-digital DSTs that aim to improve shared decision-making in antipsychotic prescribing have demonstrated improved perceived involvement and disease knowledge, which is associated with better clinical outcomes[8]. However, a key feature missing in existing treatment algorithms is their ability to dynamically incorporate patients' views in the decision-making process. We wanted to fill this gap and create a more intuitive, patient-friendly and web-based application for comparing antipsychotics in terms of their likelihood of causing specific side effects.

Our DST

Our computer-based DST, "In Control of Effects", was developed by RStudio v.1.1.463[9] using the package Shiny[10]. The production version of the application is hosted on a Ubuntu 16.0.4.4 x 64

server using Shiny Server Open Source (v.1.5.9.923). The DST is an application, which is structured into three screens: instructions, side-effect selection and results (Figures 1a&b). The user navigates between the individual pages using a series of clicks. The initial section presents instructions for using the application and emphasizes that the purpose of the DST is to act as a decision support tool only in the context of a discussion between the patient and the treating clinician. In the second section, participants are presented with four side effects (weight gain, sexual dysfunction, irregular heartbeat and stiffness/tremor) and are asked to select one side-effect they would like to avoid. The side effects were chosen on the basis of data availability from a recent meta-analysis [11]. Each side-effect is accompanied by a short explanation of that side-effect in lay language, which can be accessed by tapping or clicking a toggle to reveal content. When a participant submits their responses, they are led to the results section and are shown a list of the top three medication recommendations, as well as the top three antipsychotics to avoid.

The database used to rank the antipsychotics in terms of specific side-effects was based on the results of a network meta-analysis of published and unpublished randomised controlled trials [12]. User input was coded as binary (0 = not selected, 1 = selected), and then used to generate a new score per medication by averaging the prevalence of the side-effects per drug weighted to the preferences of the participant. A lower score indicates a decreased likelihood of experiencing the side-effects selected (i.e. more favourable) relative to the other antipsychotics in the dataset, whereas drugs with a high score have an increased risk of producing the side-effect.

In this study we aimed to qualitatively explore the acceptability and usefulness of the DST from the perspectives of patients, carers and psychiatrists.

OBJECTIVE

We aimed to explore psychiatrist, patient and carers' views on the acceptability and usefulness of our newly developed DST in relation to its use as a shared decision-making tool between clinicians and patients. Our intention was to use the study findings to modify and make further improvements to the DST, before piloting it in a real-world clinical setting.

METHODS

Participants and setting

Two focus groups took place at the Warneford Hospital, Oxford Health NHS Foundation Trust in Oxford, United Kingdom, between June and August 2018 (one focus group with psychiatrists and one with patients, to allow both user groups to speak freely without any reticence and to promote constructive discussions). Ethical approvals were not required due to the project being classed as Quality Improvement by Oxford Health NHS Foundation Trust; however written informed consent was taken from each participant prior to their participation.

The focus groups aimed to identify how acceptable the DST was to psychiatrists, patients and carers in terms of its layout, content and applicability to the clinical setting. Focus groups were deemed more appropriate than individual interviews as they enabled collective discussion and debate between users with multiple perspectives.

Access, Recruitment and Sampling

Psychiatrists were recruited to the first focus group through the Thames Valley Higher Trainee in General Adult and Old Age Psychiatry Forum. Those who expressed an interest in participating were provided with a participant information sheet via email and were asked to contact the researchers.

The second focus group was undertaken with patients and carers, who were identified via the Patient and Public Involvement Lead for Oxford Health NHS Foundation Trust, who posted an advertisement for the focus group via a number of forums including local patient and public involvement groups, Trust intranet, patient/research websites, social media outlets and through local mental health partnerships and charities. To be eligible for study inclusion participants - whether patients or carers - had to have had a mental health diagnosis requiring treatment with an antipsychotic (currently or in the past).

A convenience sampling strategy was implemented for both focus groups (i.e. all those able to attend were invited). Information and guidance to run the focus groups were found on the Involve website[13]. The focus groups began with a researcher (LW) providing a short, interactive, visual demonstration of the DST, before answering questions relating to it. Each focus group lasted one hour and was informed by a topic guide that covered themes relating to the DST's layout, content, applicability, usability and acceptability (Table 1). The focus groups were moderated and facilitated by at least two researchers from the team: CH and LW led the psychiatrists' focus group, whilst CH, LW and IK led the patients/carers' one. Focus groups were digitally recorded and then transcribed by a local transcription service. All identifying participant details were anonymised during transcription and the focus group recordings were destroyed.

Table 1: Examples of questions from topic guide used to undertake focus groups with psychiatrists and patients/carers

- Can you tell me what you think about the layout of the DST?
- Can you tell me what you like/do not like about the DST?
- Can you think of any ways the DST could be improved upon (structure, format etc..)?
- Can you think of anything that should be added/removed to the app to improve it?
- Are you aware of any other example of electronic decision-making tools?

Specific to psychiatrists
- What are the strengths and weaknesses of using this app in clinical practice?
- Do you think the DST may have any impact on the doctor-patient relationship (i.e. too lengthy in set up, or too impersonal)?
- Are there any particular patient groups or circumstances where this tool can be particularly useful (or unhelpful)?
- Are there any advantages/disadvantages of using this DST in clinical practice?
- Are there any "links/shortcuts" that you would like to have on your iPad/computer, when

> using the app (such as a link to the BNF, or a list of contraindication/interactions)?
> - How do you feel using an electronic tool compares to using more traditional methods in clinics (e.g. book-based guidelines)?
>
> Specific to patients/carers
> - Are there any advantages/disadvantages of using this DST in your clinic appointment?
> - How do you think other patients and carers will respond to the DST?
> - Do you think it may have any impact on your relationship with the doctor (i.e. too lengthy in set up, or too impersonal)?
> - How do you feel when your doctor would use an electronic tool compared to using more traditional methods, such as a book, in your clinic appointment?

Data Analysis

Data was thematically analysed and managed using the Framework approach[14]. This approach allows qualitative data to be analysed flexibly and systematically, as data is entered into a grid matrix that allows researchers to review data within and across participants[14]. A researcher (CH) coded the transcripts and, using the constant comparative method to iteratively compare new findings with existing findings as they emerged from the dataset[15], any similarities and differences in perspectives between psychiatrists and patients/carers were established. Transcript data were inserted into a Framework matrix to enable data ordering and synthesis[14]; this enabled within and across case data analysis from both focus groups. Through this process, relevant themes pertaining to participants' views and perspectives on the DST emerged from the dataset. These emerging themes were discussed within the research team (CH, LW, IK) as a method of triangulation to verify the study findings.

FINDINGS

Summary of Main Themes

Eight participants attended the focus groups (four psychiatrists and four patients/carers). The four psychiatrists were relatively young (mean age: 38 years, range 30-45) and had been practicing clinically for eight years on average. They all regularly treated inpatients and outpatients who

needed antipsychotics prescribing. The average age of the patients/carers was 60 years (range 53-67). Patients/carers had a range of mental health diagnoses, including bipolar disorder, anxiety and depression, and all had experience of taking, or caring for someone taking, antipsychotic medication. Summary characteristics are presented in Table 2. The main themes to emerge from the dataset about the DST were 'prescribing preferences and practices', 'consideration and awareness of side-effects', 'app content, layout and accessibility', 'influence on clinical practice' and 'role in decision-making'.

Table 2: Summary characteristics of psychiatrists and patients/carers

	Psychiatrist n=4		Patients/Carers n=4
Age (years)	38 ± 7	Age (years)	59.5 ± 6.1
Years in practice	7.75 ± 2.9	Experience with antipsychotic medication	
		- Currently taking	1
		- Taken in the past	2[1]
		- Carer	2[1]
Approximate number of patients seen each month in clinical practice who need antipsychotic medication	11 ± 6	Diagnosis	
		- Depression	2
		- Bipolar disorder	1
		Medication taken	Amitriptyline, Stemetil, Chlorpromazine, Trifluoperazine, Halopirdo

[1]One person fulfils the criteria of both groups.

Prescribing preferences and practices

All psychiatrists commented that the DST would help increase their awareness and consideration of a wide scope of medications. They felt this was necessary as they admitted that they generally prescribed a limited selection of drugs, based on anecdotal evidence and simplistic cost-

effectiveness considerations. However, a lack of familiarity with some of the DST's recommended medications, and the fact that some were not licensed for use, provided a deterrent.

'Bar Loxapine, which I've seen once, I've never seen any of the others…That would not be helpful for me.' Psychiatrist 2

Patients and carers commented that the DST could provide a useful starting point for discussions with their doctor about medication preferences, as it ranked medications in terms of suitability to their own preferences.

'I want to have the greatest chance of success on proven clinical stuff so far…But number one would be the one to start with…If it didn't work, then try number two.' Patient/carer 1

Psychiatrists felt that the comprehensive, up to date and evidence-based information on the DST would increase their prescribing confidence with new medications. However, contextual factors relating to patients' physical and social health, were noted as also influencing psychiatrists' prescribing practices, something which was not factored for by the DST. Despite this, psychiatrists felt that it could be a useful base for considering medication options with patients.

'You're much more constrained in the antipsychotic you could give each patient…But it could still be used as a launch pad for those types of discussions.' Psychiatrist 4

Consideration and awareness of side-effects

Psychiatrists commented that doctors often make prescribing choices based on efficacy, without considering sufficiently the impact of potential side-effects. Conversely, patients/carers stated that a

drug's side-effect profile would substantially influence their likelihood of compliance and that this information was crucial. All participants felt that information relating to a patient's age and co-morbidities on drug efficacy, mode and frequency of administration and potential side-effect severity should be included within DST. They also felt it should provide a balanced level of information on the most common side-effects of each drug listed, to allow patients to decide how acceptable these side-effects were.

'[Otherwise] you'd be selecting a drug without necessarily thinking about what the other side-effects could be…And then you get prescribed one that actually has another side-effect that you don't want at all, but it wasn't even mentioned.' Patient/Carer 1

Patients/carers felt that receiving information about the likelihood of experiencing a side-effect and its subsequent severity would enable them to weigh up the risk versus benefit ratio, informing their decision-making.

'Weight gain in 3% of the population… You'd probably say, I'll be okay with that even if you are already overweight. Whereas if it's 50% of patients that use this put on weight, you'll probably think, then I'm not so sure.' Patient/Carer 1

App content, layout and accessibility

Visuals

The DST was described as 'attractive' and 'readable' by most participants, with its blue and green features perceived as 'healthcare colours'. However, some visual design improvements were suggested, including incorporating the word 'decision-aid' into the name of the DST, increasing the font size, providing bite-size sections or drop-down lists of content and visually depicting the highest

ranked medications and their side effect profiles. Most participants wanted percentages displayed as they were easily understandable.

'I think everybody understands if you say 100%...Because if it was a 50% chance of weight gain, that's a fair chance you're getting it. It's a toss of a coin. Whereas if it was just 10%, you might not, I suppose.' Patient/Carer 1

Interactivity

All participants felt the tool was simple and straightforward to use, whether on a mobile or a laptop, and that it was easy to navigate.

'I'm all for simplicity and I found it… I'm a technophobe. I've got my smartphone. It's not set up yet. But I used that smartphone with no problem at all.' Patient/Carer 4

The DST was seen as a means of stimulating, rather than replacing, discussion, avoiding paternalism by promoting shared decision-making between doctors and patients. However, a couple of psychiatrists felt the DST would be more accessible if it was downloadable, rather than requiring WiFi access. Most participants felt it would be most useful as an adjunct to other information sources such as the internet, leaflets and face-to-face discussions.

'It's part of an armoury of enabling patients to be involved in their treatment decisions.' Psychiatrist 4

One patient/carer suggested that a supplementary app website would be helpful, with patients being directed to it after their introduction to the DST during their consultation with their doctor.

'If you've got it on a website…Having done it in the office with you… They can go away if they haven't made the decision and play with it some more, which might be useful.' Patient/Carer 4

Influence on clinical practice

All psychiatrists felt that the DST could be utilised clinically, both in cases of first-episode psychosis and for long-term service-users, as a monitoring and review tool. They felt that the more they used the DST, the more likely it would be to change their clinical practice.

'I imagine that if it is something that is very routinely used … I'd like to think somebody like me would make changes over time. Not within a week, two weeks, but maybe over a year.' Psychiatrist 2

Some psychiatrists felt there was a danger that the DST could increase paternalism if the drugs listed on it were not perceived as clinically relevant, as this could result in doctors overriding patient preferences if they felt that the patient's drug of choice was not credible. However, others commented that it could help educate doctors about the efficacy and side-effect profile of relatively unknown medications, increasing the likelihood of them being integrated into practice.

'Certainly, there's things there which I'm sure I'm going to learn that I will integrate into my practice as I go along. If there is a link for the evidence, that could be very helpful, actually, because every evidence needs to be looked at and can be discussed, debated, argued against.' Psychiatrist 2

Psychiatrists felt the DST was unsuitable for use in Primary Care as general practitioners may lack the knowledge or experience to prescribe antipsychotics. However, some patients/carers felt it could be used by general practitioners as a referral tool or to help monitor psychiatric patients in primary care, especially if patients were unable to see their psychiatrist immediately due to long waiting lists.

'You'd see a doctor a lot quicker than you'd see a psychiatrist if you're feeling awful. Wouldn't you want to see your doctor pretty quickly for a potential change of drug that might assist you, rather than wait?' Patient/Carer 1

Role in decision-making

All participants felt patients should be involved in decision-making around medication choices and that the DST promoted informed choice, patient engagement and discussion around potential trade-offs between side-effect tolerability and drug efficacy.

'This fulfils, or could fulfil, a valuable purpose in getting a bit more buy-in to treatment from patients. Because the drug has come out of their preferences, and not you saying, you should go on this.' Psychiatrist 4

Regarding compliance, all psychiatrists felt that patients would be more likely to comply with their medications after engaging with the decision-making process via the DST. However, some patients/carers felt that regular face-to-face doctor/patient discussions were required to avoid patients feeling pressured into making decisions using the DST alone. All participants acknowledged the complexity of the decision-making process and felt the DST was a small piece of the whole picture.

'The app… It's a good start…Sometimes decision-making is more complex. You as a clinician have to take more into consideration rather than just a few clicks, side effects' Psychiatrist 1

DISCUSSION

The focus group findings have demonstrated the potential of the DST to increase clinician and patient knowledge, confidence and awareness of a wide range of antipsychotics, as well as providing a forum for enhancing collaborative patient-clinician decision-making. However, a number of issues were identified, which, if addressed appropriately, could substantially improve the acceptability and credibility of the tool.

The inclusion in the tool of any antipsychotic studied in a randomised controlled trial (either licensed or unlicensed, commissioned or non-commissioned) was viewed by psychiatrists' as unnecessary and unhelpful. It is important therefore, that the list of recommended medications on the DST are carefully reviewed and adapted to ensure that only medications that are available in a specific clinical context are included[16]. This will serve to increase the usability, acceptability and relevance of the DST for both patients and clinicians, whilst avoiding potential disappointment or frustration that seemingly suitable medications are unattainable.

Participants appreciated the DST's ability to rank medications in terms of suitability, with regard to their side-effect profiles, but commented that they would like more information about the likelihood of experiencing a side-effect from one medication compared to another. This is something which warrants careful consideration when making further modifications to the DST[17]. Whilst the visual ranking of different drugs can be a useful discussion aid, care must be taken to ensure that the information on display is not misleading. For example, a lack of clarity around whether the data presented ranks drugs against one another or versus placebo is possible, as is confusion around whether the relative or absolute risk is being presented. This could lead to clinicians and patients selecting drugs based on evidence that has been misinterpreted, raising ethical issues around informed choice[18]. Care must be taken to ensure that the data are based on the best available evidence and presented in a transparent way, whilst remaining accessible and easily understandable to patients and clinicians alike[19].

In addition, in response to feedback from participants, the DST could be further modified to increase the number of side-effects displayed so as to provide patients with a realistic overview of the side-effects they are most likely to encounter with different types of medications[20]. This is important, as whilst a patient may express a strong desire not to take a drug that leads to weight gain, if they see that this drug is more likely to cause a number of other side-effects than a slightly lower ranked (but still efficacious) drug, they may use this information to inform their decision-making, which may in turn affect their subsequent medication compliance.

Any clinical tool should be accessible to the wider patient population and reflect the needs of a variety of patients, including those who are not technologically experienced. This can be achieved not only by ensuring that the information presented is as simple, understandable and easy to navigate as possible, but also by considering the provision of supplementary resources to complement the information provided. Our DST is intended to be used as an adjunct to, rather than a replacement for, face-to-face clinical discussions[21]. This message must be clearly conveyed to both patients and clinicians in order to avoid disappointment, communication errors or a breakdown in the clinician-patient relationship, all of which may lead to a reduction in compliance and an increase in patients' dissatisfaction with care.

CLINICAL IMPLICATIONS

The DST improved participant involvement and knowledge about medications by demonstrating the advantages of a digital solution to guide clinical decision making in real world practice. There is a need for further modifications to be made to the tool to ensure that it meets the preferences and requirements of patients, carers and clinicians. Once these changes are complete, the newly modified DST will be tested in a pilot acceptability study in psychiatric outpatient settings across different geographical areas, to collect data on how patients and clinicians experience using the DST,

the subsequent impact on patient outcomes and to increase the generalisability of the findings. In addition to enhancing informed choice for patients, improving patient-clinician communication and ensuring that clinical prescribing practices in psychiatry are consistent, the digital platform can provide a cost-effective solution to aligning the provided advice with the latest available evidence[22]. This will be an important step in the field of precision medicine in clinical psychiatry.

AUTHOR CONTRIBUTORSHIP

Catherine Henshall prepared the first draft of the manuscript and collated authors' input. Ivan Koychev and David Ruvolo designed and implemented the ICE application with substantial input from Andrea Cipriani. Catherine Henshall, Leona Wolters and Ivan Koychev designed and conducted the focus groups and Catherine Henshall undertook the data analysis. All authors provided substantial contributions on the data interpretation and revising it critically for important intellectual content. All authors have given final approval of the version to be published and have provided agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

COMPETING INTERESTS AND FUNDING

DATA SHARING

Data are available upon reasonable request from the corresponding author (CH) (chenshall@brookes.ac.uk) and is comprised of deidentified focus group data from participants.

PATIENT CONSENT AND ETHICAL APPROVAL

Ethical approvals were not required for this study as it was deemed to be a Quality Improvement project by the participating NHS Trust. However, written informed consent was obtained from all participants before they took part in the study.

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