

Digitally Mediated Schizophrenia Care – A Swedish Case of Translating, Designing and Expert Evaluation of Dialog+

Bertil Lindenfalk^a, Andreas Gremyr^{a,b}, Marcus Lundmark^b, Torbjörn Jacobsson^c

^a Jönköping Academy for Improvement of Health and Welfare, School of Health and Welfare, Jönköping University, Jönköping, Sweden

^b Department of Schizophrenia spectrum disorders, Sahlgrenska University Hospital, Gothenburg, Sweden

^c Department of Addictive disorders, Sahlgrenska University Hospital, Gothenburg, Sweden

Abstract

This work presents initial results of translation, design, development and expert testing of a digitally mediated dialogue based tool for schizophrenia care in Sweden. Dialog+ is a conversational methodology that has been shown to empower patients, promote co-produced and more cost-effective care. Dialog+ was translated and the digital application was redesigned to fit with the local context using human-centered design principles. Initial results of expert user testing, using heuristic evaluations and cognitive walkthroughs, shows promise for the method to work well also in Swedish settings. Initial testing with patients shows promising results. This work exemplifies how care patterns can be improved by considering the information layer of the interaction and creating shared and collaborative working spaces during treatment sessions can help to both empower patients and facilitate a more co-produced treatment plan.

Keywords:

Schizophrenia, Empowerment, Digital Technology

Introduction

People with severe mental illnesses, such as schizophrenia, live 10-20 years shorter than the rest of the population in the OECD countries [1]. Two reasons appear to be central; low adherence to treatment [2] and too little medical attention when a person is suffering from other chronic conditions simultaneously, for example, stroke, cancer and diabetes [3]. Despite the requirements of the Swedish Patient Act, treatment and follow-up do not seem to be characterized by patient participation. How can care be offered in a way that makes the person with psychiatric problems an equal in the planning, implementation and evaluation of their care?

Dialog+ is a conversational methodology utilising digital technology to support patients with severe psychiatric problems to make informed decisions about their treatment and provide patients and therapists with the opportunity to follow the patient's development over time. Developed a little over a decade ago by The National Health Service (NHS) East London, Dialog+ has until now been tested in 15 countries and implemented specifically for more severe psychiatric conditions in the UK, but not yet in Sweden. Studies show that the use of Dialog+ in routine care provides more effective treatment, increases participation and is more cost-effective than regular treatment of good quality [4].

Dialog+ is used during patients' visits to care and contains several parts:

1. follow-up of the patient's situation through estimates of how satisfied you are with different areas of life and with the care and support you receive. In addition, the patient can indicate in which areas they want (more) help.
2. visualization of results for joint evaluation; what works well and what does not, and how has this changed over time?
3. a conversation methodology for exploring needs and opportunities, and
4. planning of measures and implementation; who does what until the next scheduled visit with Dialog+

Previous research looking into the patient and carer perspective show that Dialog+ provides a comprehensive and solution-focused structure and initiate domain-specific change in routine meetings [5,6]. Patients with schizophrenia also present other challenges to the design process as an application has to be mature enough to be tested during a visit. As it is only at this stage in the process that user testing would be feasible from an ethical standpoint. With this backdrop, the paper aims to present the work and evaluation results pertaining to the design and development of a Swedish version of Dialog+ using human-centered design principles.

Dialog+

Patient-clinician meetings are commonly used in mental health services as a means to provide care, but the content and efficiency of regular meetings are often unknown. Dialog+ is an intervention that provides structure and that seeks to ensure that patient-clinician communication is patient-centred and effective in promoting positive change.

It consists first of an assessment of the patient's satisfaction with 8 life and 3 treatment domains and establishes areas that require further help. The patient's ratings are summarised and jointly reviewed and can be compared with previous ratings. This review includes positive feedback and the patient selects domains for further discussion during the session. It's the patient who chooses in which areas he or she needs more support and what areas should be discussed during the meeting, which ensures a person-centred approach.

Finally, a solution-focused approach is used to address the patient's concerns and reach decisions for further actions. The decisions will be shown at the beginning of the following meeting in which Dialog+ is used, which ensures that all actions continuously are followed up.

Every step of the Dialog+ intervention is supported by the in-built digital application which makes it easy to follow the patients quality of life and satisfaction with treatment and support overtime on an individual level. Assessments and planned actions from every Dialog+-session are also saved in a database which also makes it possible to collect data on group levels.

The Dialog+ application was developed and designed using Human-Centered Design (HCD) principles. HCD has four defined activity phases: (1) Identify the user and specify the context of use; (2) Specify the user requirements; (3) Produce design solutions, and; (4) Evaluate design solutions against requirements [7].

Methods

In phase one, it was determined that the users of Dialog+ are both the healthcare professional and the patient as they would collaboratively work with each other during the session. The context of use is the treatment session. In addition to the literature review, the existing version of the Dialog+ application was analyzed.

User requirements are determined in part by the conversational methodology, in part by the abilities of the patient group, in part by previous research and in part by feedback supplied by people from the patient organisation for schizophrenia in Sweden. The results of phase two were summarised into various use cases which acted as the basis for phases three and four.

In phase three wireframes [8] were used to establish the logic model for navigation, interaction and structure for the application that matched the findings of phase two. Mock-ups [8] were later used to refine the design and invite the Swedish Schizophrenia Fellowship, a patient advocacy organisation, to feedback on any suggestions for improvement.

In phase four, two main methods for expert evaluation was used, heuristic evaluation [9,10] and cognitive walkthroughs [11,12]. Expert evaluations were conducted as there was a necessity to have the user interface match both the requirements of the conversational method, the identified user requirements and have it work in a treatment setting. It is predicted that by conducting expert evaluations early in a design process as much as 80% of usability problems in the interface can be eliminated [13]. Due to the ratio of benefits to costs using expert evaluators to find usability problems the recommended number of experts are 3-5 [13]. As the healthcare professional is the one to navigate the user interface it was decided to find expert evaluators that knew the conversational method well and could provide feedback of how well the design fitted the conversational method. Two external experts working as healthcare professionals were included in the expert evaluation procedure, which is in line with the amount recommended by [9-12]. Both cognitive walkthroughs and heuristic evaluations were performed in the same session which lasted for a little over an hour. Two project representatives participated during the session, one acted as the principal investigator and guided the expert through the evaluation and the other acted as note taker. The sessions were conducted over the conferencing platform Zoom™ in conjunction with an online collaborative whiteboard platform Miro™ due to Covid-19 restrictions. The sessions were recorded using the built-in recording feature in Zoom™.

Cognitive Walkthroughs

At the beginning of the session, the expert was briefed on the two tasks and the instructions were shared with the person so that they could read them as well. The session started with the cognitive walkthrough where the users were given five different use cases to complete. During the cognitive walkthroughs, the experts were asked to think aloud [14] to catch their reasoning during each use case.

Heuristic Evaluation

After having finished the cognitive walkthrough and debriefing of the task the expert was asked to evaluate the user interface (UI) in part considering the ten recommended heuristics [10] and in part making sure the UI stayed true to the conversational method. This part of the evaluation was more of a dialogue between the principal investigator and the expert with the note taker only participating in the conversation for clarification.

The ten heuristics the expert was asked to consider were the following [13]:

1. Visibility of system status
2. Match between system + real world
3. User control and freedom
4. Consistency and standards
5. Recognition rather than recall
6. Error prevention
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users with errors
10. Help and documentation

In addition to the ten heuristics, the expert was free to leave any comment that they liked but only the ten heuristics were prompted during this stage of the evaluation.

User group feedback

In addition to the two conducted expert evaluations, healthcare professionals were introduced to the conversational method and the accompanying user interface. During a full-day training session, 17 healthcare professionals were educated in the conversational methodology using role-playing scenarios and were shown the application in its current state.

Results

The results of the human-centered design process are presented in accordance with the four phases of HCD presented in the methods section.



Figure 1 - Dialog+ showing the UI for the estimate page where the current session estimate (top-blue line) are compared to the last sessions estimate (bottom-pink line). At far left each category for conversation is shown.

Phase 1 – Identify the user and specify the context of use

In phase 1 it was decided that the beneficiaries of Dialog+ were both the healthcare professional and the patient as they would be working collaboratively during the treatment session.

During this phase, a literature review of the publications concerning user feedback on using Dialog+ was performed. Guiding principles from this activity are the following:

- The questions in Dialog+ are primarily used to support the patient to express needs, rather than having to fully understand and respond to very specific questions, as is common in many questionnaires used in psychiatric settings.
- The response from the patient is further jointly explored by both the patient and the healthcare professional through the use of the conversational methodology. This is to enable a meaningful dialogue on needs and plans despite cognitive dysfunction.
- All in all making it easy for the patient to express needs and for the healthcare professional to support the joint exploration of the patient's lived reality, preferences and readiness to make changes in everyday life.
- The use of the conversational method along with the digital technology supports the ongoing treatment process by providing information on progress, enabling evaluation and recalibration of plans.

The original application was in English and hence could not be used in a Swedish context but needed translation. Not only in terms of language but also to fit the Swedish healthcare system and treatment processes, including booking, logging in as well as security. The sequential logic of the steps connected to the conversational methodology and what was shown in the UI were identified and discussed in the project group, likes/dislikes and what felt as intuitive and what navigational aspects were perceived as hard to understand.

As part of the first phase persons with schizophrenia as a user group was also researched. Two major design principles were derived from this step. First, the UI should not contain too much information and second, a call to action in respect to the conversational methodology should be a selection of a maximum of one to two choices.

Phase 2 – Specify user requirements

User requirements are determined in part by the conversational methodology, in part by the abilities of the patient group, in part by previous research and in part by feedback supplied by people from the Swedish Schizophrenia Fellowship.

The user requirements determined from the conversational methodology are:

- Each estimate should be followed up before a new one is created.
- Estimations are only guided by the healthcare professional, the patient is the one responsible for the content, including specifying future points of action.
- The UI should support the conversational methodology and not the other way around

The user requirements determined by the patient group are:

- Information displayed in the UI should be focused
- Decisions should be explicit and easily accessible

The user requirements determined from previous research include:

- The patient defines the needs during the session
- The patient should be able to express their lived reality
- The application should show where patient and healthcare professional is in the conversational methodology

The user requirements conveyed from the patient organisation include the following:

- Aborted estimations should be able to resume at a later stage or at a later date.

Phase 3 – Produce design solutions

In phase 3 design solutions were created by creating wireframes to determine the navigational logic and structure of the application. The wireframes were developed iteratively by sharing versions of the wireframes with the project group on three occasions to discuss both the logic and structure as compared to the user requirements but also with the technical requirements from the region.

Once the navigational logic had been determined and agreed upon, high fidelity mock-ups were created. At this stage, Dialog+ had been translated into Swedish by one of the project group members which is an expert on the conversational methodology. The mock-ups also took into account the graphical profile of the (regional) healthcare organization. As with the wireframes the mock-ups were designed iteratively and discussed in the project group on several occasions. During these discussions representatives from the patient, organisation were invited to participate when they had the opportunity to. Continuous contact with the representatives was also had during the entire development stage.

Use cases were developed in partnership with an expert that previously had been using a version of the conversational methodology. Five use cases were identified. The first one focused on information gathering for the healthcare professional before a session starts. Here they were asked to retrieve information about patients, read the manual and identify when the last session was. The second use case revolved around creating and conducting a new session for a new patient. The case was fictive and the patient's estimates were provided. The third case focused on a follow-up session. Here the healthcare professional would be asked to find the patient. Retrieve information from the previous session and identify trends in the estimate. Case four and five focused on complications such as the healthcare professional mistakenly pressing the wrong patient and navigating back to the patient overview or that an estimate was wrong.

Phase 4 – Evaluate design solutions against requirements

The evaluation of the design solutions against identified requirements included expert evaluations using heuristic evaluation and cognitive walkthrough methodologies. We here also present some of the design considerations needed due to technical constraints.

Cognitive Walkthroughs

The cognitive walkthroughs were combined with the talk aloud method to capture what the expert thought of the application as they finished each use case. From a learning perspective, both experts found the application to be readily accessible. The experts reported that some element states were harder to identify than others. However, the experts also reported that navigating the application was never an issue but on some occasions, such as accessing a patient estimate, easier paths could be implemented, such as in this case being able to press the name of the patient as well. One of the experts stated that they did not like that the various conversational categories had been color coded, but at the same time, acknowledged that it might have just been the opinion of one person and nothing that affected the use of the application. The overall impression of the application was from both experts that the application followed the steps outlined in the conversational methodology well and acted as an aid in its use. Adding that the suggestions for improvement were minor in comparison to the overall user experience of the application.

Heuristic evaluation

The result of the heuristic evaluation shows that the experts found ten issues with the current design of the application as it related to previously identified user requirements and the heuristics. The results can be found in Table 1 below.

Table 1: Issues identified during the heuristic evaluation categorised into the ten usability heuristics

Heuristic category	Issue identified by an expert evaluator
Visibility of system status	Both evaluators reported that they experienced that selected options could be clearer – both in terms of color but also for when they have been selected.
Match between system + real world	No issues reported
User control and freedom	Both experts wanted the option to click the name of the patient to open up a new estimate. A collapsable field collapsed when only part of the information had been filled. The experts noted that it was a good feature when all of the information had been filled in correctly as it directly moved attention to the next topic in the conversation in a natural way. Bigger font size was asked for by one of the expert evaluators.
Consistency and standards	No issues reported
Recognition rather than recall	The dates in the application were chronologically displayed in another format than in the electronic health record and that could potentially confuse some users.

Error prevention	No issues reported
Flexibility and efficiency of use	Some texts could be shortened to make them more readily accessible for glances by both patient and health professional
Aesthetic and minimalist design	The interface felt messy when comparing estimates with each other
Help users with errors	No issues reported
Help and documentation	One expert noted that the manual, although easy to find, should be searchable and not only scrollable. If you needed to look in it you are looking for something specific. They also asked for a short version of the manual to be accessible in the application

Technical implementation

The technical implementation of the application mainly concerned the security level needed for the application to accommodate patient safety and data security. The project decided to follow the same security standards used for current documentation at the clinic. This also means that the application will be ready for upscaling to other clinics within the region. Due to this, it was also decided that the application first and foremost should be designed for tablets and computers, omitting smartphones at this stage.

Discussion

Designing and developing applications meant to be used by patients diagnosed with schizophrenia places different requirements on the design process compared to other user groups. User testing is one aspect that is critical in any human-centered design approach, however, when designing for people diagnosed with schizophrenia the application must be mature enough to be user tested so that it inflicts no harm.

Earlier attempts to support higher quality schizophrenia care at scale in Sweden, through the use of new technologies, either through quality registries or point of care dashboards has failed to have the intended impact. The initial tests of Dialog+ in Swedish mental healthcare settings show promising results both in terms of a health professional, and patient/family feedback. In this paper, the expert evaluations of the application have been presented showing results that encourage further testing with the user group.

Limitations

There were two main limitations to the expert evaluations. The first was the number of experts available for the evaluations. As the experts needed to be knowledgeable about both the conversational methodology and the Swedish healthcare system the options were limited. The recommended number of experts are 3-5 and this study identified two eligible experts. Another limitation was due to the ongoing pandemic which gave the project no other choice than to conduct the evaluations using Zoom™ and Miro™.

Future work

Although the work of implementing Dialog+ is still in its cradle there are already ongoing talks of testing it with other patient groups. Scaling Dialog+ to also include other patient groups would allow for a larger user test of the digital interface, ensuring the co-production intention of utilising Dialog+ in Swedish psychiatric care. In such tests, the digital possibilities of offering Dialog+ to patients on remote premises could be explored which would allow for a reframing of the context of use.

Dialog+ has the potential to generate both patient reported outcomes (PROM) and patient reported experience measures (PREM). Further studies can explore the psychometric properties of the data generated by using Dialog+ and how data can be used to support quality improvement of psychiatric services.

Conclusions

This paper presents the results of an expert evaluation of adapting a conversational methodology utilizing digital technology for the treatment of patients diagnosed with schizophrenia to a Swedish healthcare setting. A human-centered design approach was used during the design and development of the application and the paper provides insights into how expert evaluations can be used in settings where the maturity of the application requires the involvement of users later in the development process than what normally would be recommended. The work also exemplifies how technology can be used to create collaborative spaces for information sharing between healthcare professionals and patients that benefit both in their understanding of treatment planning and actions by adopting an already tested clinical conversational methodology.

Acknowledgements

This work was in part been funded by the Innovation Platform, Region Västra Götaland. We would also like to extend our gratitude to Johanna Sandström of the patient organisation for schizophrenia in Sweden for her help and support.

References

- [1] OECD, Caring for Quality in Health, in: *OECD Reviews of Health Care Quality*, Paris, 2017.
- [2] J. Tiihonen, E. Mittendorfer-Rutz, M. Majak, J. Mehtälä, F. Hoti, E. Jenedius, D. Enkussion, A. Leval, J. Sermon, A. Tanskanen, and H. Taipale, Real-World Effectiveness of Antipsychotic Treatments in a Nationwide Cohort of 29 823 Patients With Schizophrenia, *JAMA Psychiatry* **74** (2017), 686-693.
- [3] B.G. Druss, L. Zhao, S. Von Esenwein, E.H. Morrato, and S.C. Marcus, Understanding Excess Mortality in Persons With Mental Illness: 17-Year Follow Up of a Nationally Representative US Survey, *Medical Care* **49** (2011), 599-604.
- [4] S. Priebe, E. Golden, D. Kingdon, S. Omer, S. Walsh, K. Katevas, P. McCrone, S. Eldridge, and R. McCabe, Effective patient-clinician interaction to improve treatment outcomes for patients with psychosis: a mixed-methods design, *Programme Grants for Applied Research* **5** (2017).
- [5] F. Mosler, S. Priebe, and V. Bird, Routine measurement of satisfaction with life and treatment aspects in mental health patients – the DIALOG scale in East London, *BMC Health Services Research* **20** (2020), 1020.
- [6] S. Omer, E. Golden, and S. Priebe, Exploring the Mechanisms of a Patient-Centred Assessment with a Solution Focused Approach (DIALOG+) in the Community Treatment of Patients with Psychosis: A Process Evaluation within a Cluster-Randomised Controlled Trial, *PLOS ONE* **11** (2016), e0148415.
- [7] R. Harte, L. Glynn, A. Rodríguez-Molinero, P.M. Baker, T. Scharf, L.R. Quinlan, and G. ÓLaighin, A human-centered design methodology to enhance the usability, human factors, and user experience of connected health systems: a three-phase methodology, *JMIR human factors* **4** (2017), e8.
- [8] D. Benyon, *Designing interactive systems : a comprehensive guide to HCI, UX and interaction design*, Pearson/Education, Harlow, 2014.
- [9] J. Nielsen, Finding usability problems through heuristic evaluation, in: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Association for Computing Machinery, Monterey, California, USA, 1992, pp. 373–380.
- [10] J. Nielsen and R. Molich, Heuristic evaluation of user interfaces, in: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Association for Computing Machinery, Seattle, Washington, USA, 1990, pp. 249–256
- [11] C. Lewis and C. Wharton, Chapter 30 - Cognitive Walkthroughs, in: *Handbook of Human-Computer Interaction (Second Edition)*, M.G. Helander, T.K. Landauer, and P.V. Prabhu, eds., North-Holland, Amsterdam, 1997, pp. 717-732.
- [12] J. Rieman, M. Franzke, and D. Redmiles, Usability evaluation with the cognitive walkthrough, in: *Conference companion on Human factors in computing systems*, 1995, pp. 387-388.
- [13] J. Nielsen, Enhancing the explanatory power of usability heuristics, in: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Association for Computing Machinery, Boston, Massachusetts, USA, 1994, pp. 152–158.
- [14] M.E. Fonteyn, B. Kuipers, and S.J. Grobe, A Description of Think Aloud Method and Protocol Analysis, *Qualitative Health Research* **3** (1993), 430-441.

Address for correspondence

Bertil Lindenfalk, bertil.lindenfalk@ju.se