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From Many to One: Designing a Unified Flowsheet in the EMR to Replace Multiple Disparate Devices

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Abstract. This study represents a post-implementation qualitative inquiry for a maturing flowsheet design that aims to replace multiple disparate devices used for data entry. The flowsheet has already experienced multiple iterative development cycles based on formal feedback from formative and summative usability studies. This next phase focused on a semi-structured qualitative interview to provide new feedback that will be used to further refine the product. Results of the 9-item interview were both actionable and provocative, revealing multiple avenues of improvement and a new usability map that can inform future studies and design plans.

Keywords. usability, clinical informatics

1. Introduction

Patient care workflows have become increasingly fragmented as more devices are introduced into healthcare. Providers, in particular, suffer though severely disrupted patient encounters as they must switch between multiple disparate systems for both data entry and retrieval. This disjointed process contributes to significant documentationrelated stress, adding to frustration, decreasing job satisfaction, and ultimately leading to burnout. This presents an increased risk for errors in patient care, while also creating obstacles to any underlying research.

This project represents an ongoing effort to integrate all components of the Deep Brain Stimulator (DBS) workflow into a unified flowsheet in Epic 2019. The current build of the flowsheet (Figure 1) is the result of multiple iterative development cycles, based on formal feedback from formative and summative usability studies. These earlier studies were designed to elicit both quantitative and qualitative feedback, and to produce a functional product. There were no pre-existing tools in the EMR that fit the needs of this specialty service at the time of implementation.

Clinical staff have now had time to explore the latest functional version of the flowsheet. So, to inform the next phase of development, this study used a semi-structured qualitative interview to capture actionable information from these experienced users.

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	HDRS - Hamilton Depression Rating Scale					productivity. Rate 3 if the patient does not spend at least
		Depressed Mood	2			three hours a day in activities excluding routine chores.
		Feelings of Guilt	2			4=stopped working because of present liness. Rate 4 if patient economic in polactivities excent routine chores, or if
		Suicide	3			patient fails to perform routine chores unassisted.
		Insomnia: Early in the night	2			
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		Retardation				
		Agitation				
		Anxiety somatic				
		Somatic symptoms gastrointestinal				
		General somatic symptoms				
		Genital symptoms				
		Hypochondriasis			•	
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Figure 1. Flowsheet design

2. Methods

For this phase of the study a semi-structured qualitative interview was used to collect feedback about the maturing product, following a successful method that we have previously described¹. Study participants were chosen from the group of clinical and support staff who used the most recent build of the flowsheet in the second half of 2019 to access, record, and retrieve information in patients' health records. Now that these clinicians had sufficient time to explore and experiment with the most recent iteration, they were approached to provide long-form feedback about their experiences. There were nine interview questions in total, organized into three categories: content, interface, and process. Each individual question was open-ended and calibrated, designed to elicit long-form responses that describe benefits, problems, and suggestions relevant to each category (Table 1).

Table 1. Semi-Structured Qualitative Interview Questions

Content					
What are the benefits of using this flowsheet to capture the responses of your surveys / rating scales?					
Describe any problems with the content provided by this flowsheet.					
How can we improve the content provided by the flowsheet?					
Interface					
What are the benefits of using this flowsheet interface compared to the previous system(s)?					
Please describe any problems you had accessing or navigating the flowsheet.					
What kind of functionality would make the flowsheet easier to use?					
Process					
Does this flowsheet improve your workflow, and if so, how?					
What are your main concerns or problems with integrating this flowsheet into your workflow?					
How can this flowsheet be modified to improve your workflow?					

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3. Results

7 clinicians provided feedback for the semi-structured qualitative interview. Results are summarized in Table 2.

Benefits	Problems	Suggestions	
Faster than paper	Clinical workflow sometimes varies	Open flowsheet automatically	
Quick data entry	Difficult to find and open flowsheet	Automatically fill some fields	
Easy to review information	Needs to be clickable with mouse	Collapse groups by default	
Compare data over time	Does not capture hand-written notation	Rearrange groups	
Automatic totals/calculations	Need more space for comments	More verbose row descriptions	
Clean interface	Some content already out of date	Row information displayed first	
Row Information acts like a	Few missing items	More row restrictions	
reminder	Need more information near timestamp	Additional content	
One place for all information		Make some content mandatory	
Standardized documentation		2	
Easy to use			
No paper, better for environment			

Table 2. Semi-Structured	Qualitative Interview	Responses, Summarized
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4. Discussion

The initial build of the flowsheet was guided by meetings with stakeholders and one-onone sit downs with experts; these formative activities defined users, user needs, and basic workflows². The flowsheet has now experienced multiple iterative development cycles and is becoming a more refined product.

A semi-structured qualitative interview was chosen as the method to elicit feedback for this phase as it is well-suited for one-on-one discussions, easy to accommodate, and offers the opportunity to uncover additional information beyond just the starting question. Conversations are *initiated* by the pre-determined open-ended questions, but additional questions and responses are allowed to emerge as the dialogue between interviewer and interviewee develops³. In this way, copious feedback was obtained through the interviews.

Participants were quick to identify issues that would slow down the patient encounter or lead to more data entry; speed and efficiency were a key focus of the feedback, consistent with other qualitative studies of the EMR as a whole⁴. This included comments about how easily and rapidly the flowsheet could be accessed and made ready for use. Timeliness was a common theme, particularly when talking about interface design and recording patient data. A few edge cases were also discussed, such as when a more verbose comment would need to be entered by the clinician, or when hand-written notation could not be adequately reproduced in the system.

Suggestions to speed up the workflow included automatic opening of the flowsheet upon starting the patient encounter, switching to a mouse-driven interface, and beginning with a collapsed view of the groups to minimize scrolling.

Overall, this round of qualitative interviews captured multiple new points of actionable feedback that emphasize the time-sensitive nature of our clinicians. This feedback has led to the creation of a new usability map, which will influence future development cycles (Figure 2).



Figure 2. Usability map - design recommendations

5. Conclusions

Qualitative usability techniques can produce structured, actionable feedback for iterative development processes, which contribute to a mature digital workflow that reduces data entry burden for clinical teams.

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