Participatory ergonomics for healthcare process redesign: the example of family-centered rounds

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Abstract. We describe a participatory ergonomics project aimed at redesigning the complex healthcare process of family-centered rounds (FCR) in a pediatric hospital. The participatory process involved 10 representative FCR stakeholders (e.g., physician, nurse, parent) over a period of 10 months. This participatory ergonomics project demonstrated how human factors and ergonomics principles (e.g., usability, shared mental model) could be integrated into the redesign of complex healthcare processes. Several challenges needed to be overcome to facilitate participation and collaboration among a diverse group of stakeholders, such as identifying the optimal number and type of stakeholders, and scheduling and organization of meetings.

Keywords. Participatory ergonomics; healthcare; process redesign; pediatric hospital.

1. Introduction

According to Wilson (1995), participation in ergonomics is "the involvement of people in planning and controlling a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals" (page 331). Participatory ergonomics has been primarily applied to task redesign with a focus on reducing physical demands and improving occupational health (Haims & Carayon, 1998; Hignett, Wilson, & Morris, 2005; Rivilis et al., 2008; van Eerd et al., 2010; Wilson & Haines, 1997). Two studies reported using participatory ergonomics for broader applications, such as redesigning training and entire jobs (Nagamachi, 1995; Robertson, 2000). In this project, we use participatory ergonomics to redesign a complex healthcare process, i.e. family-centered rounds or FCR, with multiple tasks (e.g., review plan of care, order medications) and multiple stakeholders (e.g., patient, family, physician, nurse).

Patient- and family-centered care is becoming increasingly important for patient safety and satisfaction (Kuo, Bird, & Tilford, 2011; Little et al., 2001; Maeng, Graf, Davis, Tomcavage, & Bloom, 2012; Stewart et al., 2000; Wanzer, Booth-Butterfield, &

Gruber, 2004). In the pediatric setting, we need to engage children and families in their own care processes, e.g., FCR, as well as in efforts to improve healthcare systems and processes (AAP, 2012). This is particularly important for hospitalized children, who are at high risk of medical errors (Kaushal et al., 2001). Family-centered rounds or FCR represent a unique opportunity to engage children and families during a child's hospitalization (AAP, 2012; Latta, Dick, Parry, & Tamura, 2008; Muething, Kotagal, Schoettker, del Rey, & DeWitt, 2007). However, numerous system barriers, e.g., disruption of workflow, healthcare team size, physical room constraints, communication barriers, hinder family engagement during FCR (Carayon et al., 2011). In our previous research, we identified strategies for redesigning the FCR process and related work system (Kelly et al., 2013). The next step of this research included a participatory ergonomics process aimed at implementing an intervention to improve family engagement during FCR. In this paper, using qualitative research methods, we describe the participatory ergonomics process, and barriers and facilitators to collaboration in the participatory redesign process.

2. Methods

The study was conducted in an academic pediatric hospital located in the Midwestern US. The goal of the participatory redesign process was to design and implement an intervention aimed at enhancing family engagement during FCR. The participatory redesign process involved a series of 6 meetings with a team of 10 stakeholders over a period of 10 months. The stakeholders included healthcare team members (physicians, residents, nurses), management (medical director, nurse managers), and a parent. Five researchers (PC, MK, AX, RC, YL) managed the participatory redesign process, and facilitated the meetings with the 10 stakeholders.

Between 4 and 7 months after the end of the redesign process, we interviewed the 10 stakeholders individually, and asked questions about what facilitated or hindered the collaboration between stakeholders during the redesign process. Interviews ranged from 30 to 45 minutes, and were audio-recorded and transcribed.

Using the work system model (Carayon, 2009; Smith & Carayon-Sainfort, 1989), we conducted a qualitative content analysis (Graneheim & Lundman, 2004) of the interview transcripts to identify facilitators and barriers to collaboration.

3. Results

3.1 Participatory Ergonomics Redesign Process

The participatory redesign process took place over a period of 10 months and involved several activities. Using combined observations and interviews, we analyzed the FCR process with regard to all work system elements (people involved, tasks, tools and technologies, physical environment, and organization). We also conducted surveys of healthcare team members and parents about their perception of various strategies to enhance family engagement during FCR (Xie et al., 2012). The 10-month redesign process involved 6 meetings with the stakeholder team. Each meeting lasted between 2 and 4 hours, and involved 4 to 8 of the 10 stakeholders. The role of the stakeholder team was to: 1) define an intervention to enhance family engagement in the FCR process, 2) create an implementation plan for the intervention, and 3) champion the implementation of the intervention.

The intervention to redesign the FCR process included a checklist of accepted best

practices for engaging families on FCR (e.g., introducing everyone, discussing assessment and plan for day, reading back orders), and a series of training and information sessions involving various stakeholders (e.g., physicians, nurses). The checklist was designed to help all stakeholders to actively participate during FCR and effectively communicate with each other, and thereby develop a shared mental model of daily and discharge goals. A pilot study of a prototype of the checklist identified a number of usability issues (e.g., location and visibility of the checklist) that needed to be addressed in order to optimize checklist use.

Throughout this process we engaged and regularly communicated with medical and nursing leaders in the hospital. For instance, the medical director of the hospital was involved in the stakeholder team. She helped in solving a number of implementation issues, e.g., providing an extra computer. We had quarterly meetings with the project's steering committee, which included several medical and nursing leaders of the hospital.

3.2 Barriers and Facilitators to Collaboration

Interviews with the stakeholders identified several work system barriers and facilitators to collaboration in the participatory redesign process. We describe selected barriers and facilitators using quotes from the interviews.

Tasks before, during and after meetings

Researchers spent considerable time and effort in preparing for meetings. Members of the stakeholder team were informed in advance of the agenda of the meeting, and were often asked to prepare for the meeting (e.g., reading material, reviewing data, collecting information from colleagues). This preparation was appreciated by the stakeholders: "*I like that there were times there were slides with the data and that notes were sent out ahead of time.*"

At the beginning of each meeting, a review of past accomplishments kept stakeholder representatives on the same page ("*Showing of the timeline each time…here is what we did, here is what we have been doing, here is where we are now, that is good.*"). On the other hand, the review was also perceived by some stakeholders as inefficient ("*Sometime it felt like (reviewing) was just repeating the same thing over and over.*").

A number of actions taken in between meetings facilitated collaboration. These included: communication with other stakeholders ("*You asked for different feedback and tried to get all the perspectives from people. You were kind of fishing for all sides of the story. I think that was helpful.*"), carrying out decisions made during meetings ("*Moving things forward in between the large group meetings just made a big difference.*"), and catching up when missing a meeting ("*It was important, if you had not been at previous meetings, to have that sort of review information.*").

Organizational factors

Team size influenced collaboration in conflicting ways. While a large team could accommodate more perspectives ("*Having more perspectives is always good.*"), stakeholder representatives sometimes found it difficult to speak in front of a large team ("*Speaking up in a large group is difficult anyway.*"). On the other hand, a small team might have limited the number of perspectives involved in the redesign ("*At one of the meetings, there were only four of us. I remember thinking that felt really small, and I hope we were not missing anyone's perspective.*"), although it could be more efficient ("*By making the group smaller, we could be more efficient and probably have fewer meetings.*"). The number of representatives from each stakeholder group ("*It may have been nice to have one or two more nurses what was able to participate. When two people*

can bounce that off one another, you might be able to come up with a few other ideas.") and the balance between representatives from different stakeholder groups ("*It is a group dynamic thing. If there is one person who is really different than everybody else that person either gets marginalized or brought up.*") also influenced stakeholder collaboration.

Scheduling of meetings influenced not only stakeholder attendance, but also collaboration during the meetings. While long meetings were exhausting and overwhelming ("*We were doing those four-hour extravaganzas; that was too much.*"), short meetings might have been inefficient and difficult to schedule ("*It strikes me that if you artificially break meetings into smaller chunks, in the end maybe you are not being as efficient, because you have got the restart time in each meeting.*"). Therefore, a balance between duration of meetings and total number of meetings was necessary ("*Two hours is great ... And it is hard to schedule. Then you had to schedule more often.*"). The duration of meetings also needed to fit the content of meetings ("*I did not feel that the four-hour meetings were, wow, its two hours of material in four hours. I did not feel that at all. It really was four hours of material in four hours.*").

4.   Discussion and Conclusion

This study demonstrated how participatory ergonomics could be applied to the redesign of complex healthcare processes. Human factors and ergonomics principles were used for the design of the intervention (*content of intervention: what is changed in system*) as well as the implementation of the intervention (*process of intervention: how the system is changed*). The intervention included a checklist of FCR best practices that was aimed at helping members of the care team (e.g., child, family, physician, nurses) develop a shared mental model. Enhancing team awareness was a key goal of the intervention as team members (e.g., parents, nurses) were encouraged to ask questions and bring up issues during FCR. We integrated human factors literature on checklist design (Degani & Wiener, 1993) and considered usability principles, such as content, format, roles and workflow, in the design of the FCR checklist. We also used several human factors implementation principles (Carayon, Alyousef, & Xie, 2012; Karsh, 2004; Smith & Carayon, 1995) in the participatory process: leadership commitment (e.g., steering committee), representative stakeholder participation, communication and feedback (e.g., information sessions), learning and training (e.g., training of physicians in the use of the FCR checklist), and project management (e.g., preparation and follow-up of meetings).

Participatory ergonomics in healthcare can be challenging because of staff workload and patient care demands. This was clearly highlighted in a study of participatory ergonomics where ICU (Intensive Care Unit) nurses had difficulty finding times to meet and were often interrupted by requests for patient care (Bohr, Evanoff, & Wolf, 1997). Our study involved participation and collaboration among a diverse group of stakeholders, which was necessary given the focus on FCR. However, this collaborative process with multiple stakeholders and their unique needs, beliefs and perspectives can be even more challenging. Interviews with the stakeholders identified barriers and facilitators to collaboration in the participatory ergonomics process. To support the participatory ergonomics process, these barriers and facilitators need to be addressed at the planning stage.

Specifically, a participatory ergonomics in healthcare with multiple stakeholders needs to be implemented in an efficient and effective manner. Meetings need to be prepared very carefully. When someone cannot attend a meeting, the facilitators or researchers need to reach out to them and keep them involved and engaged in the redesign

process. Scheduling of activities needs to be planned long in advance. A flexible, but structured and organized approach to the participatory process is necessary (Haims & Carayon, 1998). For instance, initially meetings with the stakeholders were scheduled for 4 hours; at the end of each meeting, feedback forms were distributed to the participants. Feedback showed that 4-hour meetings were difficult for the participants because of other commitments and scheduling challenges. Therefore, after two 4-hour meetings, the rest of the meetings were only 2-hour long. This required that additional work be done outside of meetings and the meeting time be used in a more focused and efficient manner.

This case study described the participatory ergonomics process used to redesign the FCR process for enhancing family engagement. It was conducted at a single academic children's hospital, which limits the generalizability of the results to other hospitals. Additional empirical studies are necessary to illustrate how participatory ergonomics can be applied to healthcare system redesign and to provide data on the healthcare quality and patient safety benefits of participatory ergonomics. Future reports on our research will describe the actual implementation of the redesign (e.g., use of the FCR checklist) and impact of the process redesign on family engagement (e.g., survey of parents).

Acknowledgements

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