



Human-Centered Design Reflections on Providing Feedback to Primary Care Physicians

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Abstract. To better understand physicians' current and desired feedback experiences on their interactions with patients, this qualitative study applied design thinking methods to facilitate discussions and produce artifacts. Nine primary care physicians and one medical resident participated in a design workshop to understand experiences, needs, and opportunities for design. Thematic analysis found that, 1) Feedback, received in many forms, is important to physicians' practice and patient well-being, 2) there are concerns about the impact of certain types of feedback, and 3) experience and system-related factors can impact physicians' workflow and interactions. Tools to improve feedback should take into account these considerations. While residents may desire immediate, direct feedback, concerns about the potential impact on patient care and their current workflow are important.

Keywords: Feedback · Design thinking · Primary care

1 Introduction

1.1 Feedback in Primary Care

Feedback is a valued tool for improving physician-patient interactions. It can cover a wide range of interactions from visits, including both the clinical and social aspects of provider communication [13]. Previous research has assessed and provided guidelines for administering feedback. A study on Veteran's Affairs physicians' perceptions of performance feedback showed that the process and receipt of feedback was one that garnered emotion and that acceptance of the feedback was impacted by directness [17]. In the context of validating recommended feedback guidelines on medical interviewing, physicians noted the preference for non-judgmental feedback directed towards specific skills and aligned with their personal goals [11].

Yet feedback is a complicated process to understand and implement. While many studies have evaluated the quality and impact of feedback, variations in efficacy demonstrate a need for further research on implementation and communication [5]. Additional research is needed to understand the method and nature of feedback that would be useful for and accepted by physicians.

1.2 Design Thinking Framework

To understand primary care providers' experiences and needs around feedback, a design workshop was conducted to understand how physicians receive feedback and how new designs might be integrated into their work. This human-centered design approach allows experts and end users to add experience-driven insight and ideas to developing concepts through various activities in an interactive workshop setting [12]. The application of this method with inclusion of potential users has been documented positively in health technology design [14, 19].

While not commonly appearing in medical education interventions, participatory design workshops and its collaborative nature are becoming more frequently encouraged [4]. Workshop methods allow for user participation in creating or improving designs. Previous studies about understanding physicians' perceptions of and experiences with feedback have used interviews as a methodology [6, 17]. The use of human-centered design methods in this study allows for further collaboration in design; it actively involves working with potential users through every phase of the process in medical education, from understanding the problem to creating a solution.

The research described in this paper is part of a larger study to understand physician feedback through the human-centered design approach involving end users in participating in the design process. The primary aim of this workshop was to understand the experiences and desires of primary care providers around feedback. Workshop goals were: 1) Understand current provider experiences with feedback, preferences for feedback, and interactions with patients, 2) Gain a sense of workflow, pain points, and opportunities to improve interactions with patients, and 3) Use a participatory approach to learn how physicians may envision a feedback system and brainstorm initial design concepts.

2 Methods

A design thinking workshop and qualitative thematic analysis of the results were the primary methods used in this research study. The study was approved by the IRB committee at DePaul University.

2.1 Design Workshop

Participants were recruited from a family medicine residency program at a clinical facility in Chicago, IL. The residents in this program see patients in inpatient and outpatient settings at the clinic. The 10 total participants in the workshop consisted of nine residents and one medical student. Of these participants, half identified as female, half as male. Six were under age 30 and four were ages 31–40 years old. Five identified as Asian/Pacific Islander and five as white.

The design workshop lasted 2.5 h and consisted of three activities: poster prompts, journey mapping, and prototyping. These activities were sourced from the researchers' own experiences in design thinking. The aim of these activities was to not only produce artifacts to describe physicians' experiences and needs, but also to act to start discussions. Participants worked individually for the first activity and in groups of 3–4 for the second

Table 1. The three activities during the workshop.

Activity	Description	Research question
Poster prompts	Participants wrote individual responses on sticky notes to four prompts	How might physicians experience feedback and interactions with patients?
Journey mapping	Participants detailed tasks, interactions, and emotions of typical work weeks in timeline format	How might we understand physicians' short- and long-term workflow?
Prototyping	Participants created paper versions of their feedback concepts	How might physicians envision a feedback tool?

and third activities. After each activity, there was a share-out and discussion of the results of the activity. Table 1 describes the activities and goals.

For the poster prompt activity, participants were given post-it notes and ten minutes to respond to four prompts: *How do you typically receive feedback, how do you prefer to receive feedback, describe a negative interaction you've had with a patient, and describe a positive interaction you've had with a patient.* Participants were encouraged to write one thought or response per post-it note; they could contribute as many responses as they liked during the time period. Figure 1 shows the result of the poster prompt activity.

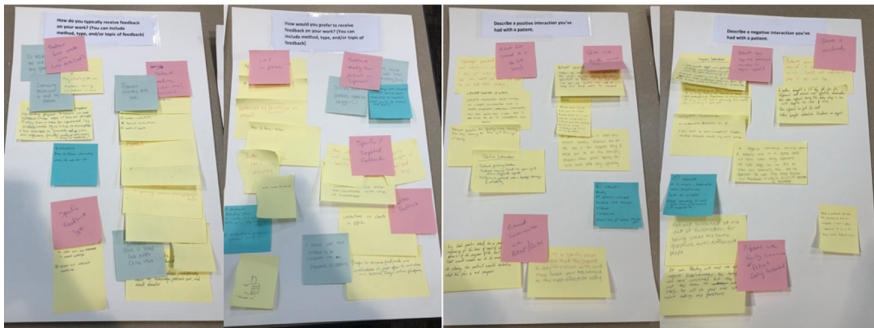


Fig. 1. Responses to prompts detailing the nature of patient interactions and current and desired feedback in the first activity.

Participants were divided into groups of 3–4 for the journey mapping activity and given highlighters, crayons, tape or glue, notecards, and plain paper. They were instructed to create a timeline of typical events, actions, interactions, and feelings before an appointment, during an appointment, and after an appointment. Participants were encouraged to consider the responses from the previous activity in creating their journey maps. The journey maps are shown in Fig. 2.



Fig. 2. The three journey maps showing tasks, interactions, and emotions included in a typical appointment experience.

To create the prototypes, participants were instructed to use the materials given to them to create basic designs for a feedback system that could be used before, during, or after appointments to improve their interactions with patients. There were no requirements for how or when the tool would operate, or the type of feedback the system would produce, but they were encouraged to consider all responses and products from the first two activities. The prototypes from this activity are shown in Fig. 3.

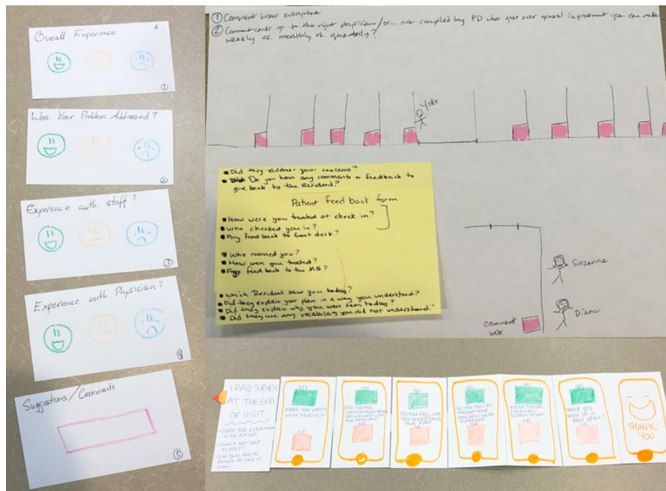


Fig. 3. The three prototypes of the imagined feedback system created during the final activity.

2.2 Data Collection

Data consisted of video recordings from three cameras set up at the back and sides of the room, notes taken by research staff, photos, and the artifacts from the activities: the artifacts from the poster prompts, journey maps, and prototypes. After the workshop, videos were transferred to a secure network folder and audio from the share-outs and group discussions was paraphrased into a script. Observational notes and relevant notes from and descriptions of the artifacts were included with the script for analysis.

2.3 Data Analysis

Thematic analysis with open coding was used to analyze the dialogue from the workshop using focus group techniques. Open coding is a method where a coder identifies labels, themes, keywords, and interpretations of text, artifacts, or other relevant data without use of a predetermined coding scheme [15, 16]. Next, the codes were transformed into digital post-it notes using the web application *Stormboard* to create an affinity diagram: notes were grouped into themes and a hierarchy of themes was created through several rounds of axial coding: grouping notes and creating keywords to summarize each group [1]. See Fig. 4 for a screenshot of the affinity diagram in *Stormboard*. The final themes were sent to two research staff that assisted with the workshop for validity and feedback.



Fig. 4. Screenshot of Stormboard affinity diagram showing axial themes and subthemes from transcript, notes, and artifacts.

3 Results

Open coding the script and observational notes from the session and artifacts produced 228 codes. From these codes, three primary themes were derived from axial coding: 1)

Feedback, received in many forms, is important to physicians' practice and well-being, 2) There are concerns about the impact of certain types of feedback, and 3) Experience and system-related factors can impact physician workflow and interactions.

3.1 Feedback, Received in Many Forms, is Important to Physicians' Practice and Patient Well-Being

Participants described many ways in which they currently receive feedback in their work. Feedback from staff and patients are received in several mediums (written, verbal), for various targets (clinical, interactions), and at various intervals (specific and immediate, summarized later). The written and oral mediums refer to the fact that physicians may receive feedback that is recorded and delivered in a written or digital evaluation. Verbal feedback may or may not contain similar information but is orally communicated. Clinical feedback is focused on the technical diagnoses, treatment, and other medical advice physicians give their patients, whereas evaluations on interactions describe the interpersonal aspect of visits. Feedback that is given during or right after is referred to in the results as 'immediate', and often tends to be quite specific. 'Delayed' feedback is usually compiled into a summary of multiple visits or interactions and delivered days, weeks, or months after the interactions occurred. This information is displayed in Table 2.

Table 2. Summary of feedback received

Timing	Feedback from clinical staff	Feedback from patient
Intermediate	Face-to-face evaluation of patient plan Verbal advice on patient care and management Notes and corrections in patients' charts	Emotional response to care during visit Health status of patient
Delayed	Written and oral evaluations on clinical, interpersonal, and professional performance	Summary of post-visit surveys on satisfaction

The participants reported variations in the formality of feedback from the clinical staff they were mentored by. Formal evaluations were often received at set intervals, such as quarterly or annually. This included appointment reviews, one-on-one meetings reviewing milestones, strengths, and weaknesses, and summarized evaluations viewable online. Informal feedback typically consisted of advice or corrections regarding specific interactions with patients throughout the workday.

Aside from receiving summarized patient satisfaction surveys in their evaluations, feedback from patients was often more ad hoc, during or after appointments. Direct feedback from patients often occurred during the appointment, frequently from patients communicating emotion. Patients might verbally communicate their satisfaction with their provider. Participants also viewed the patients' health status as a form of feedback:

“In the immediate, it’s how the patient is doing overall...Am I seeing changes in their health? That’s good, positive feedback.”

Time with patients was described as generally positive, but interactions could be impacted by patients’ current health or emotional status or care plan compliance. Negative interactions occurred when patients were non-compliant with treatment plans, did not listen, or came in sick or unhappy. Participants described an intentionality around creating positive interactions and patient well-being. As both a method of caring for patient health and receiving feedback, one resident noted checking in on patients after the visit or if they were in the hospital. Another noted that they were the ones to do the follow-up calls to patients (as opposed to the medical assistants), as they were sometimes able to resolve negative interactions that way.

3.2 There are Concerns About the Impact of Certain Types of Feedback

Similar to the ways in which they receive feedback, participants noted a variety of ways in which they desired to receive feedback: written, verbal, immediate, or summarized.

Many participants expressed a desire for face-to-face, targeted feedback. Receiving feedback later meant that they would likely receive more generalized feedback, which was less desirable. As one participant stated, “I prefer one-on-one verbal feedback. It’s easier to get more specific details on feedback. If you have to wait four months, it’s usually more generic...instead of the specific aspects that I do well or things that need more work.”

Each group independently produced a prototype of a post-visit patient survey. These surveys focused on experience and satisfaction measures, with the ability for this feedback to be sent to the physician the patient had seen that day. According to the participants, surveys have the potential to provide more honest feedback, as patients are not being watched. Cultural norms sometimes prevent critical feedback of doctors. Alternatively, some noted that they may instead receive less valuable feedback through surveys, as patients may tend to provide mean, instead of helpful, feedback.

Participants expressed mixed feelings about anonymity of feedback. Negative feedback from a patient could impact how they give care. Anonymity allows for honest feedback without repercussions from the physician. A resident noted that, “And now the fact that I know you gave that feedback, it’s going to make me feel crappy, and the next time I see you despite me wanting to treat you the right way, I may not be able to, or there’s a little bit of bitterness.”

3.3 Experience and System-Related Factors Can Impact Physician Workflow and Interactions

Participants’ workflow, mood, and interactions with patients and faculty were shaped by a variety of factors, from clinical experience to interactions with the EHR system.

Residents have constant access to the EHR via smartphone. They viewed this access as both positive and negative as they interact with this system throughout their day for various reasons. One participant noted the advantage of being able to check the EHR system on the way from their car into the medical center. Another expressed frustration

with the number of messages received through the system, “it’s annoying to have your phone keep going off.”

Another way in which the EHR system may act as a burden on their workflow is during charting. Chart review and updates are necessary to patient care and woven throughout their workdays. Participants noted the difficulty of trying to update a patient’s chart during appointments if they have a long list of medical issues and the negative feelings they have around charting.

Experience impacts the efficiency and nature of residents’ work. One participant described having to make many notes to themselves; more experienced residents do this less as they become better at filtering what information is important. Multitasking with the patient and EHR became easier with more experience. Additionally, those further along in their residency see more patients than junior residents and have less time with each patient. A larger patient load impacts their ability to conduct follow-up calls, instead having patients schedule follow-up appointments.

4 Discussion

Participants were eager to receive feedback and improve or maintain their patients’ health. Residents receive feedback in many ways throughout their career, both in informal ways and in formal evaluations determined by the medical center. Findings from the workshop align with previous work on the topic of feedback and provide additional insights to help guide further research and design.

From the findings, three reflections on feedback for physicians in primary care settings are as follows: 1) Feedback is welcomed and important, but not all is viewed as helpful or trustworthy. Feedback should be provided in a way that supports physician growth, 2) Critical feedback may be difficult for physicians to receive and react to appropriately in the moment; a system should provide feedback in a way that won’t impact patient care, 3) Physician workflow should be considered when implementing a feedback system; feedback should be integrated naturally into the short- and long-term flow of work as to not add to workflow or distract from their clinical work.

Feedback is important to participants’ improvement of their own practice, which in turn improves their patients’ health. They demonstrated willingness to actively seek feedback from clinical staff with more experience than them. Much of the feedback received as part of their routine evaluations were seen as beneficial, particularly specific, immediate feedback. However, they expressed skepticism over anonymous survey data, despite mostly creating prototypes of that nature. Similarly, one study in the UK found that general practitioners valued patient feedback but questioned the validity and utility of survey feedback when interviewed about their thoughts on patient surveys [6]. Given this result, surveys may not be the best tool for providing feedback to physicians. Any tools that aim to provide feedback to physicians should consider these frustrations and preferences to ensure that feedback provided is useful and trusted.

Participants expressed the difficulties of receiving negative feedback in a non-anonymous manner. They were concerned that their ability to continue to provide unbiased and proper care might be hampered by knowing that a specific patient has criticisms of their care. A system that provides feedback to a physician will provide critical evaluations in order to assist them in improving their practice. Given the concerns noted by

participants, the delivery and timing of feedback should consider how their interactions with patients might be impacted.

To support the participants' desire for immediate and specific feedback, real-time feedback is a mode that could be considered in future design and evaluations. Studies that have looked at the implications of real-time feedback in the primary care space have found opportunities for this type of system. On evaluating a system providing live visualizations during telehealth calls, physicians noted an increased awareness around non-verbal interactions such as eye gaze [7]. In a simulated environment, a sun-moon visual provided feedback on affiliation and control based on non-verbal cues. Although participants noted the potentially distracting nature of the tool, they found an increased awareness of their behavior [10]. There is evidence that automated, real-time feedback may be acceptable and useful for improving physician-patient interactions. However, additional research and evaluation is needed to determine how these tools may be effective in naturalistic settings with a diversity of patients and clinicians.

Day-to-day tasks provide interruptions to workflow and opportunities for feedback. These factors should be considered in when and how feedback should be communicated to physicians. This is important not just for efficiency, but also for physician well-being. It is documented in previous research the impact EHR systems can have on burnout and physician's work [8]. Excess messages and notifications, stress associated with use of the systems, and the amount of time spent on paperwork outside of office visits, EHRs and other health technology may be contributing to burnout [8, 9]. Burnout has several negative impacts to both the physician and the patient, including physical and mental health issues, decreased patient satisfaction, and clinical errors [18].

Workshop participants noted the adverse impact that updating patient charts had on their own work, including the burden of time from these tasks. Furthermore, patients may also feel negatively about their providers' focus on the computer screen during the visit [3]. Experience may impact workflow as well. Even within EHR use, physicians have individual workflow styles [2]. Additional work should not be added to physician's schedules. Feedback systems should consider how workflow may vary between physicians, in addition how the feedback might fit into their workflow.

5 Conclusions

Determining the most effective approach for providing feedback to clinicians in a clinical setting is a complex issue with great potential for innovation through design thinking methods. The workshop with medical residents highlighted the need for more rigorous design approaches to determine how to best provide feedback.

A limitation to this research is the homogenous nature of the participants. All participants were in their early years of practice at the same medical center. Those with more years of practice or those practicing at different medical centers or clinics may have different experiences, as well as variations in needs and desires for feedback shared by those experiences. Additionally, the patient perspective was not considered in this study, as the physician-side improvement of interactions was the primary focus.

Additional research should investigate further the themes uncovered in this workshop and design implications surrounding those themes. As the prototypes appeared to focus

primarily on the existing structure for feedback from patients in the form of surveys, future research should encourage participants to explore alternate forms of feedback. Further prototyping and testing of prototypes focusing on real-time, automated feedback is needed.

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