# A Patient-Centered Design Thinking Workshop to Improve Patient-Provider Communication in Cardiovascular Medicine

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## Abstract

Healthcare providers are expected to deliver care improvement solutions that not only provide high quality patient care, but also improve outcomes, reduce costs, ensure safety, and increase patient satisfaction. Human-centered design methodologies, such as design thinking, allow providers to collaboratively ideate solutions with patients and family members. We describe a pilot workshop designed to teach providers the stages of design thinking while working on improving patient-provider communication. Twenty-four providers (physicians, nurses, technical staff, and administrative staff) from multiple cardiovascular units attended the workshop with five former patients and family members from those units. The workshop educated on and guided teams of providers patients and family members through the stages of design thinking (empathy, define, ideate, prototype, test). Pre- and post-event assessments indicated an increase in knowledge of the design thinking methodology and participants' ability to apply it to a clinical problem. We also present recommendations for designing a successful design thinking workshop.

## Keywords

clinician-patient relationship, patient activation, patient satisfaction, design thinking, patient-provider communication, human-centered design

## Introduction

Healthcare providers are often expected to ideate new methods of care delivery that not only provide high quality patient care, but also improve outcomes, costs, safety, and patient satisfaction. Design thinking, which encourages designers to work closely with end-users to understand problems and ideate, define, prototype, and test solutions, is a skill set that can help providers creatively solve problems while incorporating the perspectives of patients and family members (1,–6).

The design thinking methodology complements existing institutional practices, such as patient-centered care, and can also be incorporated into quality improvement and lean processes such as plan-do-study-act (3). It has been used in healthcare settings with a number of methods of empathizing to gain patient perspective and needs, including codifying safety reports and patient experience surveys (7), constructing a repository of unmet institutional needs (2), and such needs-finding activities as literature review, clinic observations, and in-person interviews (8,9). Outcomes from design thinking projects in healthcare can also be measured in a number of

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ways, focusing on user experience, participant education, user interactions, culture, and operational metrics (10).

This case report describes a pilot design thinking workshop within an academic cardiovascular center that aimed to describe the concepts of design thinking and give providers an opportunity to work with former patients to identify problems and ideate innovative solutions. The design and implementation of the workshop is described, self-assessment of knowledge gained by participants and solutions from the workshop are presented, and key recommendations and considerations for designing a design thinking workshop are introduced.

## Description

The University of Michigan (U-M) Frankel Cardiovascular Center (FCVC) Innovation Program serves a cardiovascular center within a large (>1000 beds, >2 M outpatient visits in 2020) academic medical center located in Ann Arbor, Michigan. The FCVC Innovation Program strives to include input from patients and families in its innovation programming (11,12) . In alignment with this strategy a design thinking workshop was held where providers worked with former patients on innovative solutions to problems. There were two goals of the workshop: (i) to describe and apply design thinking methodology as a framework for providers (cardiovascular center faculty, staff, and administrators) to identify clinical problems and generate potential solutions, and (ii) to stimulate a culture of patient-centric innovation at the cardiovascular center.

### Planning and Recruitment

The design thinking workshop was implemented through a collaboration between the cardiovascular center, Fast Forward Medical Innovation (FFM), a biomedical innovation, entrepreneurship, and commercialization unit of the U-M Medical School's Office of Research,  and HealthDesignBy.Us, a local health design collaborative that was affiliated in part with the academic medical center. This collaboration was formed as FFMI staff served as administrators of the Innovation Program and had an existing relationship with HealthDesignBy.Us. The planning committee consisted of several members: (i) two cardiovascular center faculty (cardiology and vascular surgery) that co-chair the Innovation Program, (ii) two staff members from the innovation and commercialization unit that administer the FVC Innovation Program, (iii) the cardiovascular center quality data manager, and (iv) a physician faculty member who holds expertise in patient-centered participatory design and a leadership role in HealthDesignBy.Us. Staff from HealthDesignBy.Us also assisted in planning the event agenda, workflow, and introductory presentation. These faculty and staff represented the cardiovascular care experience, quality goals and data, expertise in healthcare innovation and patient-centered design, and administrative capabilities to plan and execute the event.

The planning committee aimed to pick a topic for the workshop that aligned with strategic cardiovascular center and academic medical center quality goals and metrics, as well as one that closely affected patients and family members. With these criteria in mind, the committee chose to focus on patient-provider communication by posing the question, "How might we improve the conversation between patients and providers in the FCVC?"

Providers were recruited from six key units within the cardiovascular center: Cardiac Intensive Care Unit (CICU), Cardiovascular Intensive Care Unit (CVICU), Cardiovascular Center Clinic, Center for Circulatory Support Program (CCSP), Diagnostic Vascular Unit (DVU), Cardiovascular Step Down Unit (CSDU). Particular attention was paid to recruiting nursing and technician roles, as many aspects of care that are important to patients are under the influence of these staff (13). A representative from each of these units, typically a nursing director or supervisor, was asked to recruit coworkers and select a patient or family member that had received care in their unit. The U-M Office of Patient Experience was engaged to invite patients and family members. Informed consent for patient information to be published in this article was not obtained because the workshop was not human subject research. Groups were assigned by the planning committee ahead of the workshop so that providers were grouped by unit and each team contained a patient or family member that had received care in their unit.

### Workshop

The physician faculty member from HealthDesignBy.Us, with expertise in patient-centered participatory design, led the workshop. At the start of the workshop, participants received an overview of the importance of participatory design in healthcare and the design thinking methodology (Empathy, Define, Ideate, Prototype, Testing). Participants were then led through participating in each step by the workshop facilitator. The workshop was two hours long and was held from 11 a.m. to 1 p.m; lunch was served. The time dedicated to each stage of design thinking is listed below.

Empathy (15 min): Providers were instructed to interview their patient or family member by asking open-ended questions. Providers were specifically instructed to take on a listener role, treating the patient or family member as the expert.

Define (10 min): Providers and patients/family members were coached to work together to select and define a problem that the patient/family member had mentioned in the Empathy step. Participants were given cues such as, "I was surprised to learn…" and "The patient/family member needs a way to…" During this step and the remainder of the workshop, providers and patients/family members were instructed to work in collaboration.

Ideate (15 min): Participants were instructed to list potential solutions to address the defined problem. Here, the workshop leader stressed creativity. Participants were provided materials that included large pieces of paper, Post-it® notes, large easel paper, pens, and markers.

Prototype (15 min): Participants were instructed to choose one of the solutions generated during the Ideate step, and

sketch or build a prototype of how it would work. Supplies that were made available during this time included markers, Post-it notes, construction paper, Play-Doh, dowels, and pipe cleaners.

Test (30 min): Each group shared their idea and prototype with the other participants in the room. Participants were allowed to offer feedback and suggestions. The workshop leader stressed that this portion was the beginning of the testing and prototyping process, and that participants should perform cycles of prototyping and testing outside of the workshop.

During each step, FFMI staff members recorded notes about problems, ideas, and solutions identified. Photographs were taken of any notes or prototypes generated by group members. All notes and photographs were shared with teams after the event to aid continued progress towards viable solutions.

### Workshop Evaluation

Pre- and post-event surveys that included self-assessments on design thinking concept familiarity and ability to apply the framework were administered via Qualtrics XM (Provo, UT) and distributed via email (Constant Contact; Waltham, MA) three weekdays before and three hours after the event, respectively.

Pre- and post-event self-assessments asked participants to rate the following statements on a five-point scale from "Strongly Disagree" to "Strongly Agree":

- I can describe the stages of design thinking.
- I am able to apply design thinking to a problem in the clinical setting to generate potential solutions.

The purpose of this rating was to assess whether such a workshop could introduce the design thinking methodology as a framework to assess and solve clinical problems. The post-event survey also asked the open-ended questions, "What did you like best about the workshop?" and "What did you like least about the workshop?"

Lastly, the pre- and post-event surveys asked participants to report on their interest in innovation, quality improvement projects, and entrepreneurship. The purpose of these questions was to help event organizers understand innovation programming that might interest this audience.

One year after the workshop, workshop teams were contacted via email to inquire whether their solution(s) had been implemented.

## Results

Twenty-four healthcare providers, three patients, and two family members from the cardiovascular center participated in the workshop. Providers included two faculty, 10 nurses, seven technicians, and five administrative staff.

During the empathy step, providers actively listened to the patients and family members in their team talk about their experience communicating while in their unit. Problems defined varied greatly in topic and specificity across teams. Each team recorded five to eight ideas. The problems defined and solutions prototyped and presented are listed in Table 1; additional solutions that received significant discussion are also listed.

Pre- and post-event assessments indicated an increase in the ability to identify the steps of design thinking and the ability to apply design thinking to a problem in the clinical setting (Figure 1). The pre-event and post-event assessments received 77% and 54% response rates, respectively. The number of respondents that reported the ability to describe the stages of design thinking, by answering either Strongly Agree or Agree, increased from 16% to 77% pre- and post-workshop, respectively. The number of respondents that

**Table 1.** Ideas Recorded and Solutions Presented at the Design Thinking Workshop.

| Group | Problem Defined | Number of Ideas Recorded | Solutions Presented |
|---|---|---|---|
| CCSP | Family member desired more physical and emotional support | 6 | • Program/app to keep family member informed when home<br>Additional solutions of note:<br>• Appointed emotional support person to help family member feel comfortable leaving the hospital<br>• Shower close by for family members |
| CVICU | Patient could not speak or write | 7 | • App to help patients communicate when cannot speak or write<br>Additional solution of note:<br>• Teleconference program to help patients communicate with families |
| Cardiovascular Center Clinic | Patient interrupted during six minute walk test | 7 | • Protected space for six minute walk test |
| CICU | Family member uninformed about expectations for palliative care | 5 | • Video to prepare families for palliative care |
| DVU/CSDU | Patient required to repeatedly communicate preferences to providers | 8 | • Specific location in electronic medical record to include patient characteristics (e.g., electronic blood pressure cuff gives inaccurate readings on patient) |
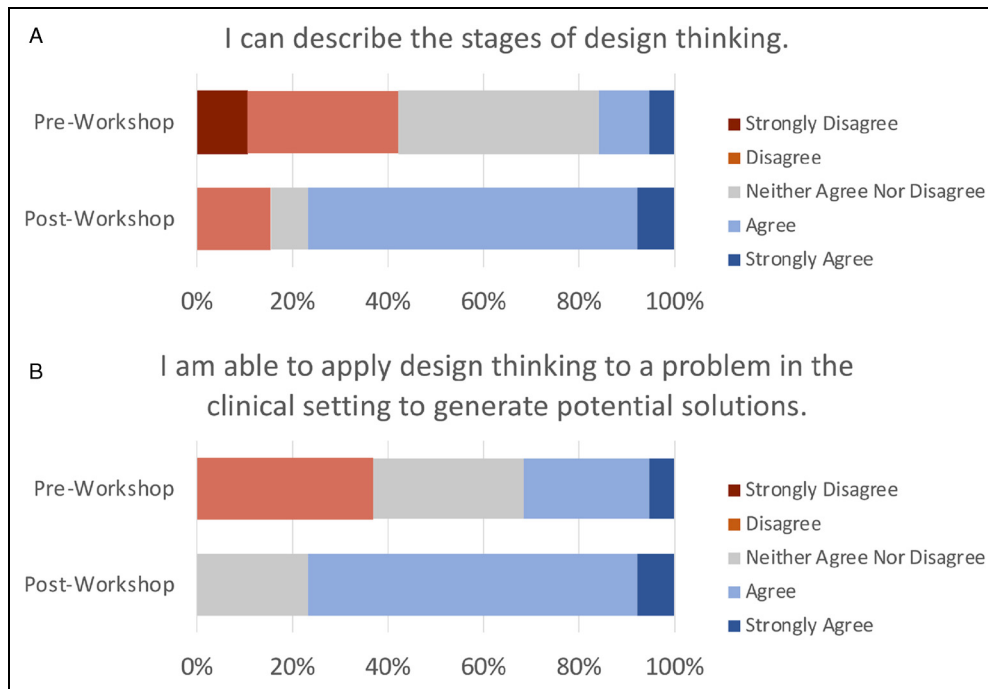
**Figure 1.** Self-Reported ability to describe the stages of design thinking and apply the design thinking methodology to a clinical problem. Pre-and post-workshop assessments demonstrated an increase in (A) ability to describe the stages of design thinking, and (B) the ability to apply the stages of design thinking in a clinical setting.

reported the ability to apply design thinking in a clinical setting, by answering either Strongly Agree or Agree, increased from 31% to 77% pre- and post-workshop, respectively.

In the post-event survey, participants reported enjoying:

- "The chance to actually work on a solution with the patient available to guide us on her priorities"
- "Working as multidisciplinary teams and getting to know others in our area of care"
- "Hearing what the patient had to say"
- "Great combination of content and hands on learning."

Answers to the question "What did you like least about the workshop?" focused on logistical aspects (room size, difficulty balancing collaboration and lunch) and one request for a follow-up session.

One year after the event, two solutions had been implemented or were in the process of being implemented. The Cardiovascular Center Clinic had purchased and installed visual warning signals to protect the area where the six-minute walk test is conducted. The patient from the CVICU partnered with the CVICU Clinical Nursing Director to develop an app to aid in communication (11).

## Lessons Learned

The pilot design thinking workshop gave healthcare providers an opportunity to work with patients to innovate solutions to problems that may not be communicated through a standard patient experience survey. The increase in self-reported ability to describe the stages of design thinking and the implementation of two solutions ideated in the workshop indicated that the event met its first goal of describing and applying the design thinking methodology as a framework for providers to identify clinical problems and generate potential solutions. The participant feedback regarding working on a solution with patients and a multidisciplinary team indicate that the pilot workshop met its second goal of introducing a culture of patient-centric innovation. Furthermore, two of the five groups either implemented or are in the process of implementing their solutions, indicating that the workshop contributed to the institutional goal of improving patient-provider communication. Further study is needed to assess whether such a workshop can be utilized as an educational intervention and whether the solutions implemented were effective at improving patient-provider communication. Below we note additional limitations of and lessons learned from administering the workshop.

### Participation Limitations

Several aspects limited the number of participants in the workshop: (i) team sizes were limited so that all team members could actively participate in the conversation; (ii) the number of teams were limited to allow for meaningful presentation and comments in the Test phase; and (iii) staff members needed to be available to be embedded in each team to provide guidance and take notes. Furthermore,

each team was asked to recruit one patient or family member to participate. Though this allowed for focused conversation during the Empathy step, this limited the number of patients and family members represented in the workshop. One may be able to overcome these limitations by increasing the number of participating groups or by holding a series of workshops. As well, teams should be encouraged to speak to additional patients, family members, and other stakeholders after the event to learn more about the problem and feasibility of the proposed solution.

The planning committee also realized that the time of the workshop may have limited the diversity of patients and family members that could attend, as many people work during the day. It was noted that a future workshop could be held outside of normal work hours to provide accessibility to additional patients and family members.

### Iterative Prototyping and Testing

Though the workshop communicated the principles for design thinking, it could not fully incorporate the iterative solution design process, where prototypes are tested by users and feedback is incorporated into the next iteration of the solution. Institutions should supplement such workshops with mechanisms to support iterations of testing and design, such as prototyping services, innovation education, and funding mechanisms to design and test ideas. In the workshop described here, participants were invited to participate in an innovation programming that provided these resources (11,12).

### Applications to Coronavirus Pandemic

This workshop was conducted before the coronavirus pandemic, though a virtual adaptation can be of particular relevance during the pandemic. As healthcare systems are changing rapidly to meet the needs of evolving institutional priorities and/or a new set of patients, such a workshop can be important for providers to innovate while keeping the needs of patients and family members at the center. Virtual conferencing platforms with breakout rooms and online collaborative white boards can be utilized to facilitate small group brainstorming discussions (14).

## Conclusions

The design thinking workshop described here achieved its key goals of describing and applying the design thinking methodology and encouraging a culture of innovation. The workshop taught healthcare providers a new way to approach clinical problems that complements existing quality improvement methods. Organizations that seek to replicate such a workshop are recommended to consider the following:

- Align the workshop focus with an institutional or departmental priority that is highly visible to attendees, especially to end-users (e.g., patients).

- Allow teams to select the patient(s) that they work to increase the likelihood of successful collaboration.
- Embed staff members at each group to ensure conversation stays focused and to take notes about all problems, ideas, and solutions discussed.
- Design thinking concepts can be conveyed in a two-hour workshop as an educational exercise; however, the success of such a workshop as an educational intervention requires future study.
- If the goal is to also have implementable solutions, support for prototyping, testing, and iterating must be made available. Support may take the form of education, funding, mentorship and/or dedicated time.

## Ethical Approval

Ethical approval is not applicable for this article.

## Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects.

## Statement of Informed Consent

Informed consent for patient information to be published in this article was not obtained because the workshop was not human subject research.

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## References

1. Roberts JP, Fisher TR, Trowbridge MJ, Bent C. A design thinking framework for healthcare management and innovation. Healthcare. 2016;4(1):11-4.
2. Carter J, Bababekov YJ, Majmudar MD. Training for our digital future: a human-centered design approach to graduate medical education for aspiring clinician-innovators. Npj Digit Med. 2018;1(1):26.

3.  Kachirskaia I, Mate KS, Neuwirth E. Human-Centered design and performance improvement: better together. NEJM Catal Innov Care Deliv [Internet]. 2018;4(3). Available from: https://catalyst-nejm-org.proxy.lib.umich.edu/doi/full/10.1056/CAT.18.0144

4.  Kim SH, Myers CG, Allen L. Health care providers can use design thinking to improve patient experiences [internet]. Harv Bus Rev. 2017. Available from: https://hbr.org/2017/08/health-care-providers-can-use-design-thinking-to-improve-patient-experiences

5.  Ku B, Shah A, Rosen P. Making design thinking a part of medical education. NEJM Catal Innov Care Deliv [Internet]. 2016. https://catalyst.nejm.org/doi/full/10.1056/CAT.16.0805

6.  Altman M, Huang TTK, Breland JY. Design thinking in health care. Prev Chronic Dis. 2018;15:180128.

7.  Aaronson EL, White BA, Black L, Sonis JD, Mort EA. Using design thinking to improve patient-provider communication in the emergency department. Qual Manag Health Care. 2020;29(1):30-4.

8.  Eberhart A, Slogeris B, Sadreameli SC, Jassal MS. Using a human-centered design approach for collaborative decision-making in pediatric asthma care. Public Health. 2019;170:129-32.

9.  Pascual KJ, Vlasova E, Lockett KJ, Richardson J, Yochelson M. Evaluating the impact of personalized stroke management tool kits on patient experience and stroke recovery. J Patient Exp. 2018;5(4):244-9.

10. Vagal A, Wahab SA, Butcher B, Zettel N, Kemper E, Vogel C, et al. Human-Centered design thinking in radiology. J Am Coll Radiol. 2020;17(5):662-7.

11. Cuddihy Meghan J, Servoss Jonathan M., Olson David C, Martin Bradley J., Vemuri Chandu, Eagle Kim A, Ghanbari Hamid. A program to drive innovation and entrepreneurship in academic cardiovascular center incorporating clinical team and patient codesign. Journal of Clinical and Translational Science. 2021;5(1). http://dx.doi.org/10.1017/cts.2021.9

12. Alyesh Daniel, Petrilli Christopher, Obi Andrea. Innovating Toward High-Value Cardiovascular Care. Journal of the American College of Cardiology. 2017;70(15):1935–1939. http://dx.doi.org/10.1016/j.jacc.2017.08.061

13. Terwiesch C, Mehta SJ, Volpp KG. Innovating in health delivery: the penn medicine innovation tournament. Healthcare. 2013;1(1–2):37-41.

14. Yarmand M, Chen C, Gasques D, Murphy JD, Weibel N. Facilitating remote design thinking workshops in healthcare: the case of contouring in radiation oncology. In: Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems [Internet], Yokohama Japan: ACM; 2021 [cited 2021 Jul 22]. pp. 1-5. Available from: https://dl.acm.org/doi/10.1145/3411763.3443445