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Abstract

Understanding and enhancing the patient experience can lead to improved healthcare outcomes. The purpose of this study was to capture a comprehensive and nuanced understanding of the patient experience on an inpatient medical teaching unit in order to identify key deficiencies and unmet needs. We then aim to implement a design-thinking methodology to find innovative ways to solve these deficiencies. Here we present the first two phases of this four-phased study. We retrospectively and prospectively collected quantitative data about patient experience with the Canadian Patient Experiences Survey-Inpatient Care. We then used this data to guide patient interviews. We identified several key deficiencies including call bell response times, noise levels at night, pain control, education about medication side effects, communication between healthcare team members, and how well healthcare team members remain up to date about patient care. In the final two phases of our study, we will select one or more of these deficiencies and collaborate with patients and other stakeholders to rapidly create, employ, and assess the impact of prototypes through an iterative action cycle until effective and sustainable solutions are found.

Keywords

CPES-IC, design-thinking, HCAHPS, patient and family centered care, patient engagement, patient experience, qualitative, quantitative

Introduction

An increasing amount of attention has been placed on capturing, understanding, and improving the experience of patients within the healthcare systems they access.^{1,2} The enhanced patient experience has meaningful outcomes including improved patient safety and fewer hospital related complications, improved care related to medical conditions, improved surgical outcomes, lower hospital readmission rates, and improved survival in certain cancers.³⁻⁸ For these reasons, now considered an integral element of patient-centered care, the patient experience is a critical measure of healthcare quality and influences both public policy and organizational incentives.^{2,9,10}

Multiple definitions for patient experience exist within the literature, and it remains a somewhat ambiguous concept.² One widely accepted definition created and validated by The Beryl Institute defines patient experience as “the sum of all interactions, shaped by an organization’s culture, that influence patient perceptions across the continuum of care.”¹¹ Wolf and LaVela (2014) sought to expand upon this definition and concluded that understanding the patient experience should lead to application, resulting in the tailoring of services to meet patient needs while

engaging patients as partners in their care.² One possible way to bridge the gap between the measurement of patient experience and the application of solutions to improve it is the design-thinking approach to problem-solving.

Design-thinking methodology utilizes the full spectrum of innovation within a human-centered design ethos.¹² This strategic approach has allowed many highly competitive and rapidly evolving industries outside of healthcare to consistently deliver effective and marketable solutions that meet customer expectations and improve customer experience.¹³ Design-thinking has been highly utilized in the private sector for many years but has only recently gained recognition as a possible means of improving healthcare delivery through the integration of more creative, interdisciplinary, and patient-centered solutions.¹³ There are now multiple promising examples of the design-thinking approach being successfully deployed to solve healthcare issues, including several studies which have demonstrated its superiority over traditional problem-solving interventions.¹⁴

The design-thinking process prioritizes deep empathy for end-user desires, experiences, and challenges to gain a thorough understanding of a problem which then informs

an innovative approach to meeting unmet user needs.¹³ In the case of healthcare, the “user” is the patient and their family, and the “unmet user needs” are negative or undesirable components of the patient experience. Once these needs are identified and understood, a collaborative interdisciplinary team embarks on a process of rapid prototyping to facilitate the expeditious acquisition of feedback and creation of multiple iterations until the ideal solution is created.¹³ Brown (2008) describes design-thinking as consisting of three spaces that demarcate related activities which together form the continuum of innovation: Inspiration, Ideation, and Implementation.¹² The inspiration space encompasses those circumstances that motivate the search for solutions, thereby fostering an empathetic understanding of the problem at hand.¹² During ideation, ideas are generated and possible solutions are developed and tested through a collaborative and iterative process.¹² Lastly, during implementation, the most desirable and effective solution is realized and upscaled for the larger market.¹²

The aim of this four-phased study is to capture a comprehensive understanding of the patient experience on an inpatient medical teaching unit, and then to collaborate with patients and other unit stakeholders to find pragmatic and innovative solutions to improve the patient experience by using a design-thinking methodology. We present our findings from the first two phases of our work in which

we both retrospectively and prospectively collected informative patient experience data using a validated survey tool, and then contrasted these findings with those from unit care providers. These findings were enhanced with exploratory patient interviews, resulting in a refined understanding of the patient experience and the identification of several unmet patient needs.

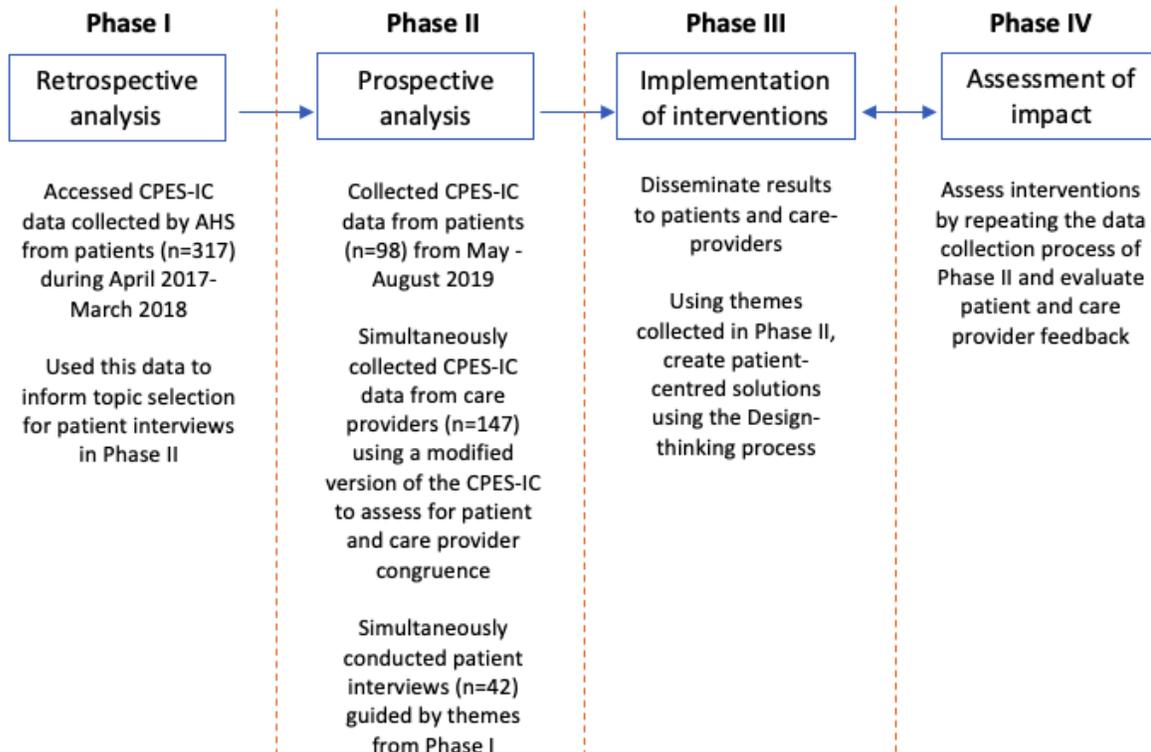
Methods

Study Design

For the purpose of this study, we chose a design-thinking methodology, informed by both quantitative and qualitative methods, and carried out over a broader four-phase research design (Figure 1). The first two phases of our study which we present here, occurred within the inspiration space of the design-thinking methodology. The third and fourth phases will occur within the ideation and implementation spaces, respectively.

To gain a comprehensive understanding of our targeted user’s unmet needs, we embarked on a discovery process informed by both quantitative and qualitative data. Quantitative data was sourced using the Canadian Patient Experiences Survey-Inpatient Care (CPES-IC). The CPES-IC (Appendix A) is a standardized, well adopted survey tool created by the Canadian Institute for Health Information and adapted from the more widely known

Figure 1. Study design



and extensively validated Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) questionnaire.^{10,16} The CPES-IC allows Canadian patients to provide feedback regarding the quality of care they received during their hospital stays. This tool informs hospitals of the quality of their patients' experiences, guides the delivery of patient-centred care and quality improvement initiatives, and provides a platform for national comparisons and benchmarking.¹⁰

A modified version of the CPES-IC (Appendix B) was also utilized to source data from unit care providers. For this modified version, those questions specific to care provided from nurses (questions one through four) were modified to instead be viewed through the lens of the nursing staff. Similarly, questions specific to care provided from doctors (questions five through seven) were modified to be viewed through the lens of the doctor. Patient experience and care provider experience are closely intertwined and can strongly influence one another. For this reason, it has been suggested that the engagement of healthcare staff be viewed as an integral component of the patient experience research process.¹⁷ The inclusion of unit care providers allowed for triangulation of findings, encouraged care provider engagement, and ensured collaboration with all potential unit stakeholders. Lastly, exploratory interviews with patients fostered a nuanced understanding of their experiences. This allowed for expansion upon quantitative results and the possible unearthing of latent needs not previously identified by the CPES-IC.

Reflexivity

Our research team consists of a diverse group of professionals with varied educational and clinical backgrounds including nursing, medicine, the social sciences, and education, as well as real-life experience being in the patient role ourselves. We acknowledge the theoretical and practical knowledge and life experience that each of us brings to our work. Although not possible to eradicate all bias, it was mitigated by the multiplicity of our backgrounds which allowed for the co-creation of meaning between participants and researchers.

Ethics

Ethical approval for this study was granted by the University of Calgary Conjoint Health Research Ethics Board, REB 18-1355.

Participants and Setting: Phase I

Participants in Phase I were patients who had been hospitalized at a large urban medical center in Calgary, Alberta. All participants had spent part or all of their hospitalization on the medical teaching unit targeted for intervention. Retrospective data from a total of 317 patients were included. Demographics for this cohort are provided in Table 1.

Data Collection and Analysis: Phase I

Results were retrieved from the CPES-IC that had been collected from patients hospitalized between April 2017 and March 2018. These surveys were administered by trained individuals from the Alberta Health Services (AHS) analytics department by telephone interview within six weeks of the participants' discharge from hospital. This data was retrieved as anonymized and password-protected files from AHS and were then collated and retrospectively analyzed by a senior research associate (K.K) using SAS (version 9.4) software.

Survey results were assessed using the Net Promoter Score as a conceptual reference for grading responses. The Net Promoter Score is a customer service metric used to measure customer experience and future loyalty by asking customers how likely they are to recommend a particular company or service to their friends and family members.¹⁸ Customers provide a response on a numerical scale from zero to ten, where a score of less than six is considered to reflect a poor experience resulting in detractor from that company's loyalty base ("detractor"), a score of seven to eight is considered neutral or "passive", and a score of nine to ten is considered a positive experience resulting in the promotion of that company's loyalty base ("promoter") and fuelling future growth.¹⁹

Using the Net Promoter Score concept as reference, responses to questions on the CPES-IC that required a choice of zero to ten on a numerical scale were considered to reflect a negative patient experience if ranked less than six, a neutral patient experience if ranked seven to eight, and a positive or desirable patient experience if ranked nine to ten. For questions requiring answers on a Likert scale ranking responses from "Never" to "Always," "Not at all" to "Completely," or "Definitely no" to "Definitely yes," only answers ranked in the "Always," "Completely," or "Definitely yes" categories were considered positive responses and comparable to a numerical ranking of nine to ten. Lastly, for questions requiring a "Yes" or "No" answer, only answers ranked in the "Yes" category were considered positive responses and comparable to a numerical ranking of nine to ten. All CPES-IC questions that did not meet a combined minimum of greater than 50% of answers ranking nine to ten, "Always," "Completely," "Definitely yes, or "Yes" ("Top Box" responses) between Phase I and Phase II were considered to indicate inadequacies in patient experience and reflective of unmet patient needs. These results were then used to guide the qualitative arm of Phase II.

Participants and Setting: Phase II

Another 98 patients hospitalized on the medical teaching unit between May and August 2019 were prospectively included in Phase II. Eighty-seven (88.8%) patients completed a survey, 42 (42.9%) completed an interview,

Table 1. Phase I patient demographic information

Variable	n (%)
Sex:	
Male	168 (53.0%)
Female	149 (47.0%)
Age group (years):	
18 to 50	78 (24.6%)
51 to 65	121 (38.2%)
66 and older	118 (37.2%)
Education level (n=305):	
High School not completed	37 (12.1%)
High School or College	170 (55.7%)
University (any or completed)	98 (32.1%)
Self-reported physical health (n=312):	
Excellent	24 (7.7%)
Very Good	46 (14.7%)
Good	92 (29.5%)
Fair	93 (29.8%)
Poor	57 (18.3%)
Self-reported mental health:	
Excellent	70 (22.1%)
Very Good	84 (26.5%)
Good	93 (29.3%)
Fair	60 (18.9%)
Poor	10 (3.2%)
Length of stay (days):	
Less than 3	60 (18.9%)
3 to 7	119 (37.5%)
More than 7	138 (43.5%)
Length of stay on unit 36 (days):	
Less than 3	81 (25.6%)
3 to 7	129 (40.7%)
More than 7	107 (33.8%)
Percent of stay spent on Unit 36:	
Less than 50%	54 (17.0%)
50% or greater	263 (83.0%)
Discharged from Unit 36:	
Yes	56 (17.7%)
No	261 (82.3%)

and 31(31.6%) of these completed both a survey and an interview. In addition, 147 care providers (nurses and physicians) from the unit were also included in the survey arm of this phase. Demographics for the patient cohort were collected from the CPES-IC and are provided in Table 2.

Data Collection and Analysis: Phase II

Three stages of data collection occurred simultaneously during Phase II. First, the CPES-IC was again utilized to prospectively collect patient experience data from 98 patients hospitalized on the medical teaching unit between May and August 2019. At the same time a modified

version of the CPES-IC was also administered to 119 nurses and 28 physicians. Data from these surveys were then analyzed in the same fashion as in Phase I, again using the Net Promoter Score as reference.

Lastly, exploratory interviews were simultaneously conducted with 42 patients to clarify and enrich the quantitative data as well as to allow for the possible unearthing of latent needs not previously identified by the CPES-IC. The questions for these interviews (Appendix C) were guided by the quantitative results from Phase I. Interviews were carried out in a one-on-one, in-person, and semi-structured fashion by a trained research assistant

Table 2. Phase II patient demographic information

Variable	n (%)
Sex (n=81):	
Male	37 (45.7%)
Female	44 (54.3%)
Education level (n=81):	
Eight grade or less	6 (7.4%)
High School not completed	7 (8.6%)
High School or equivalency completed	20 (24.7%)
College, CEGEP or other non-university certification	20 (24.7%)
Undergraduate degree or some university	17 (21.0%)
Post-graduate degree or professional designation	11 (13.6%)
Self-reported physical health (n=83):	
Excellent	8 (9.6%)
Very Good	16 (19.3%)
Good	26 (31.3%)
Fair	23 (27.7%)
Poor	10 (12.0%)
Self-reported mental health (n=82):	
Excellent	13 (15.9%)
Very Good	26 (31.7%)
Good	26 (31.7%)
Fair	13 (15.9%)
Poor	4 (4.9%)
Ethnicity (n=79):	
White	64 (81.0%)
Chinese	2 (2.5%)
First Nation	9 (11.4%)
Metis	2 (2.5%)
Indigenous	1 (1.3%)
South Asian	3 (3.6%)
Black	1 (1.3%)
Filipino	2 (2.45%)
Latin American	1 (1.3%)
Other	1 (1.3%)

(M.M). Following informed consent, interviews were held in a private manner with the patient in their hospital room and lasted between 15 to 30 minutes each. All interviews were audio recorded and professionally transcribed. The qualitative interview data was then analyzed using thematic analysis.²⁰

Results

Quantitative Results

Several deficiencies in the patient experience were identified in the CPES-IC survey data. The poorest performing patient questions included questions regarding the efficiency at which call bells were answered, noise levels at night, pain control, education about medication side effects, and patient perceptions about how well team members communicated about their care and were

informed and up to date about their care. Interestingly, nurses scored themselves lower than patients did on how often they carefully listen to patients, how well they explain things to patients, and how efficiently they respond to call bells. Physicians also scored themselves less favorably than patients regarding how well they listen to and explain things to patients. Patient, nurse, and physician survey results can be found in Table 3.

Qualitative Results

Call Bell Response Times

Patient perceptions regarding call bell response times varied. While nineteen patients praised the efficiency at which their call bells were responded to, twelve felt response times were inappropriately slow. These slow response times occasionally led to negative outcomes including patient incontinence or ambulating while unassisted. One patient stated, “I got tired of waiting for

Table 3. CPES-IC Survey Result

Canadian Patients Experience Survey- Inpatient Care Questions (Questions 1 to 7: Patient Version / Modified Nursing or Physician Version)	Percent of Answers in "Top Box"				
	Phase I Patients (n = 317)	Phase II Patients (n = 98)	Combined Patient Results	Phase II Nurses (n = 119)	Phase II MDs (n = 28)
1. During this hospital stay, how often did nurses treat you with courtesy and respect? / During this past month, how often did you treat patients with courtesy and respect?	83.9	89.5	86.7	82.4	
2. During this hospital stay, how often did nurses listen carefully to you? / During this past month, how often did you listen carefully to patients?	71.0	74.7	72.9	59.7	
3. During this hospital stay, how often did nurses explain things in a way you could understand? / During this past month, how often did you explain things to patients in a way they could understand?	64.4	73.3	68.9	55.5	
4. During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it? / How often did you respond to patients that used their call buttons to give them help as soon as they wanted it?	47.6	51.7	49.7*	30.3	
5. During this hospital stay, how often did doctors treat you with courtesy and respect? / During this past month, how often did you treat patients with courtesy and respect?	73.3	85.9	79.6		85.7
6. During this hospital stay, how often did doctors listen carefully to you? / During this past month, how often did you listen carefully to patients?	68.4	75.6	72.0		42.9
7. During this hospital stay, how often did doctors explain things in a way you could understand? / During this past month, how often did you explain things to patients in a way they could understand?	62.2	69.4	65.8		57.1
8. During this hospital stay, how often were your room and bathroom kept clean?	59.3	55.8	57.6		
9. During this hospital stay, how often was the area around your room quiet at night?	35.9	16.3	26.1*		
11. How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?	53.0	48.1	50.6		
13. During this hospital stay, how often was your pain well controlled?	49.5	34.3	41.9*		
14. During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?	65.3	60.3	62.8		
16. Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?	64.2	80.0	72.1		
17. Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?	34.7	45.3	40.0*		
19. During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?	78.6	88.8	83.7		
20. During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?	68.8	66.7	67.8		
21. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?	60.6	60.0	60.3		
22. Would you recommend this hospital to your friends and family	72.4	77.9	75.2		
30. Do you feel that there was good communication about your care between doctors, nurses and other hospital staff?	49.4	50.6	50.0*		
31. How often did doctors, nurses and other hospital staff seem informed and up-to-date about your hospital care?	43.1	55.2	49.2*		
32. How often were tests and procedures done when you were told they would be done?	56.7	64.4	60.6		
33. During this hospital stay, did you get all the information you needed about your condition and treatment?	54.7	56.3	55.5		
34. Did you get the support you needed to help you with any anxieties, fears or worries you had during this hospital stay?	51.3	50.0	50.7		
35. Were you involved as much as you wanted to be in decisions about your care and treatment?	55.3	49.4	52.4		
36. Were your family or friends involved as much as you wanted in decisions about your care and treatment?	69.2	50.0	59.6		
37. Before you left the hospital, did you have a clear understanding about all of your prescribed medications, including those you were taking before your hospital stay?	72.1	75.9	74.0		
38. Did you receive enough information from hospital staff about what to do if you were worried about your condition or treatment after you left the hospital?	60.2	57.7	59.0		
39. When you left the hospital, did you have a better understanding of your condition than when you entered?	54.0	57.5	55.8		
40. Overall, do you feel you were helped by your hospital stay? Please answer on a scale where 0 is "not helped at all" and 10 is "helped completely."	65.8	69.9	67.9		
41. Overall, what is the rating of your hospital experience? Please answer on a scale where 0 is "I had a very poor experience" and 10 is "I had a very good experience."	58.9	63.9	61.4		

*Poorest performing questions which were used to guide interview questions

nurses to come help me with things, so I started doing them on my own which I wasn't supposed to do - things like going to the bathroom and showering" (P41). One patient felt so neglected by her nurse that she considered alerting the authorities; "one night my nurse wouldn't help me. I was pressing the bell over and over again and she

ignored me. I wanted to call the police on them and make them help me" (P8). Other issues regarding call bells included a patient feeling reluctant to use their call bell for fear of inconveniencing the busy nursing staff, difficulty reaching the call bell, and call bells that did not work properly.

Noise Levels at Night

Noise at night was viewed as the largest contributing factor to poor sleep in hospital. Noise pollution consisted of alarming IV machines, noisy roommates, noisy hospital staff, and frequent patient checks by nursing staff that would awaken the patient prematurely. Six patients commented that they relied on "sleeping pills" to help them sleep through the night. One patient commented "Yeah. It's annoying. It's very noisy even with the door closed. I needed to take a sleeping pill to sleep" (P15). One patient suggested imposing a "10:00 pm curfew" as a possible solution for the nighttime noise (P40).

Pain Control

Several factors were viewed as contributing to inadequate pain control in hospital, including perceived inadequate dosing (time interval in between doses was too long, dose prescribed was too low, or medication was tapered too quickly), delays between when the pain medication was first requested and when it was finally administered, and inconsistency in the timing of pain medication administration. Four patients felt disregarded by nursing staff when they complained about their pain levels, and one patient felt that pain medication was being deliberately withheld and perceived nursing staff to become irritated when he questioned this. Another patient stated: "They give me things for pain that makes it manageable but doesn't make it go away. Here, they are so afraid to give me pain medication that the doses they give are so small that they don't take much pain away. I tried speaking to the nurses about it, but it felt like they weren't listening to me. The nurses are how we communicate with doctors. It's hard as a patient to advocate for yourself because you're tired, in pain, sick, and stuck inside all day" (P41).

Education About Medication Side Effects

Eleven patients were not educated about the potential side effects of new medications before initiating them. When this occurred, four patients were motivated to research potential side effects themselves via the internet, while others remained ambivalent. In one instance, a patient was not aware of any of the medications that had been prescribed to him, stating "I don't know what the drugs

they're giving me even are, let alone the side effects" (P19). Another patient believed she had been misinformed about how to properly take a certain medication and suffered unnecessary side effects because of this.

Team Member Communication/Being Up to Date About Patient Care

Patients who received conflicting information about their care from different members of the care team (frequently between physicians and nurses) believed that knowledge and information transfer about their care was poor. One patient stated, "sometimes I get conflicting information from doctors and nurses, about 40% of the time" (P22). Sometimes this poor communication directly impacted the patient in a negative way.

"The doctors and the nurses do not have fluid communication because the nurses have to approve everything with a doctor. Imagine all the time wasted with patients in pain because they've asked for pain meds that are waiting to be approved" (P36).

Shift changes between nursing staff were also viewed as a pivotal time during which information transfer could be lost. Some patients found it frustrating to have to get each new shift "caught up" on the specifics of their care. Likewise, patients who were frequently hospitalized also found the repetition of their healthcare stories tiresome. For instance, "I'm in the hospital regularly, so they have all my records. But every time I come in they want to hear my whole story again. I have to go through the same process every time" (P36).

Other Findings

Other deficiencies that were revealed during patient interviews included perceived negative attitudes and lapses in professionalism by care team members, examples of breakdowns in communication between patients and care team members, issues with the physical space and hospital meals, and issues related specifically to physicians. Perceived negative attitudes or unprofessional behavior from care team members made a lasting impact on patients who were quick to recall these episodes. Certain body language exhibited by nurses (e.g., failing to smile), and certain ways of communication (e.g., brief responses or using an unfriendly tone) were perceived poorly by patients and viewed as reflective of a negative attitude. One patient felt strongly that her nurse lacked empathy towards her, "Nurses need to be compassionate. If you aren't empathetic, I don't know what you're doing taking care of sick people?" (P8). Several professionalism complaints were made and included the disclosure of confidential patient information to a family member which was against the patient's wishes, failure to ask permission to insert an IV, the presence of visible tattoos on nursing staff, and nurses discussing confidential patient information within hearing range of other patients.

Breakdowns in communication between patients and care team members were also discussed. One elderly patient described how his care providers spoke too quickly for him to understand, “Doctors and nurses talk too fast for senior patients to understand, so I get confused and I just agree. I think that’s the case with most seniors. I think staff should make sure that the patient understands” (P15). Another patient had a disagreement with her care team regarding aspects of her care and felt disenfranchised, “In here, the patient is never right. What the hospital says is what goes, and the institution knows best. A hospital is one step up from a prison!” (P36).

Complaints about the physical space of the medical unit included the size of the unit (e.g., too large), uncomfortable beds, only one bathroom in a four-bed, unisex room, light switches that didn’t work, and a lack of natural lighting. Five patients also disliked the food they were provided. Physician specific complaints mainly centered around issues with continuity of care (e.g., new attending physicians each week making it difficult for the patient to know who is caring for them), a lack of “face to face” interaction with their attending physician (e.g., only seeing residents or medical students at the bedside), and the blunt or insensitive delivery of serious healthcare information.

Discussion

Understanding and enhancing the patient experience can lead to improvements in meaningful healthcare outcomes. In the first two phases of our study, we captured a refined understanding of the patient experience on an inpatient medical teaching unit using both retrospective and prospective quantitative CPES-IC data and qualitative patient interview data, ultimately leading to the identification of several important deficiencies in the patient experience. These deficiencies included the efficiency at which call bells are answered, noise levels at night, pain control, education about medication side effects, and how well team members communicate about patient care and remain informed and up to date about patient care.

Patient dissatisfaction with call bell response times is not a novel concept. It has been estimated that a typical inpatient hospital unit can receive 300-400 call bell requests per day, making this a perpetual issue that very likely permeates all areas of inpatient care.²¹ Decreasing call bell response times has previously been demonstrated to improve the patient experience.²²⁻²⁵ Faster call bell response times have also been linked to better patient safety outcomes such as reduced falls and injuries, and has been viewed as an important hospital safety indicator by patients.²⁵⁻²⁷ Several solutions for this pervasive issue have been proposed in the past, and many with great success.^{23,25,26,28,29, 30, 31} Yet the significant degree of

variability that exists between one inpatient unit to the next means there is likely no “one size fits all” answer to this problem, which is perhaps why a design-thinking approach to this issue may be valuable.

Noise within patient settings is another pervasive patient experience issue that has long plagued our hospitals. The negative impacts of environmental noise on human health and quality of life outside of the hospital have been well established and are now viewed as a key public health and safety issue for our modern world.³² It seems untenable, then, that noise within hospitals continues to persist, in some cases reaching levels more than twice the World Health Organization’s recommendation for patient rooms.³³ Hospital noise has been linked to several important negative physiological and psychological consequences for both patients and hospital staff, and contributes to poor sleep and communication barriers between patients and their care providers.³³⁻³⁷ Many researchers have previously attempted to tackle the issue of hospital noise, with variable success. Garside et al. (2018) performed a systematic review and meta-analysis of all studies reporting an intervention(s) to reduce night-time noise levels in ward settings and included nine studies in their final review.³⁸ They found that although some studies showed preliminary improvements in noise levels and patient sleep, that overall the pooled body of evidence was heterogeneous and generally weak, and concluded that there was insufficient evidence to support the use of noise reduction strategies. Whether a design-thinking approach to solving this issue provides better results is yet to be seen.

It is easily understood why inadequate pain control would negatively affect the patient experience; understanding how to remedy this issue, however, is less clear. The body of literature on the effectiveness of pain control strategies is broad and diverse due to multiple variables including the different types and causes of pain (i.e., neuropathic pain, visceral pain, post-operative pain, chronic pain, etc.), the different modalities used to manage pain, and the widely variable experience of pain between patients which is influenced by multiple cultural and personal factors. Trail-Mahan et al. (2016) previously assessed patient satisfaction with pain control both before and after a design focused intervention.³⁹ The authors used design-thinking to create a bundle of nursing practices aimed at improving patient pain control. The authors measured patient satisfaction with the HCAHPS survey both before and after their intervention and found a significant improvement in patient satisfaction scores from the 25th to the 75th national percentile. Patak et al. (2013) performed an open-ended survey with postoperative patients using patient-controlled analgesia (PCA) to assess their experiences with the PCA device and with pain control overall.⁴⁰ The authors identified several issues with the PCA-patient design interface that could be changed to improve the overall

patient experience. The authors proposed a new design for the PCA and even engineered a prototype for this purpose. Although they do not explicitly acknowledge it, their approach to this problem followed the initial stages of a design-thinking methodology. It is unclear if further evaluation was done to measure the success of their prototype, or if it was iteratively tested and refined by the research team.

Several prior authors have reported success in improving patient satisfaction with education regarding medication side effects.⁴¹⁻⁴⁶ The majority of these used interventions informed by traditional methods including literature reviews and the consultation of other healthcare providers, and many employed traditional quality improvement methods. Regardless of the specific intervention or methodology employed however, all reported improved scores on the HCAHPS after implementation of their intervention. Many authors have also reported successful interventions to improve patient satisfaction scores related to communication with their healthcare providers⁴⁷⁻⁵⁴; however, only one prior study specifically assessed the patients' experience with communication amongst their care providers.⁵⁵ Again, these studies used variable methodologies, none that resembled design-thinking.

While there has been increasing interest in collecting and measuring patient experience data globally, frequently these efforts have not translated into improved healthcare quality.⁵⁶ If a concerted effort is not made towards utilizing patient experience data to create meaningful change, then it renders the act of its collection both ineffectual and unethical.⁵⁶ Our aim is to demonstrate the design-thinking methodology as an effective way to bridge the gap between the measurement of patient experience and the application of effective, patient-centered solutions to improve patient experience and healthcare quality. We also hope to further contribute to the growing body of literature demonstrating design-thinking as an effective approach to problem-solving within the healthcare sphere.

Limitations of our study include the potential for decreased precision caused by smaller sample sizes, the potential for sample bias caused by the utilization of survey data collected from a very localized patient population during an isolated timeframe and being limited to only those questions/topics presented by the CPES-IC. These limitations will potentially inhibit the generalizability of our results to other inpatient units and hospitals. We also acknowledge that the CPES-IC has not been validated to be provided in a modified fashion to healthcare providers to assess their perspectives. As no formal cognitive testing or validation was done in this regard, there is the potential for response bias within our healthcare provider survey results; however, our experience suggests that validation of the CPES-IC for use in this cohort may be feasible in the future. Lastly, the

CPES-IC has not been validated to be provided to patients immediately before discharge, but after discharge, when the patient has left hospital. Patient surveys in Phase II were conducted just prior to discharge while the participant was still in hospital. This may possibly bias participants to provide more favorable answers to questions regarding their healthcare team while still under their care. This could explain why participants scored nurses and physicians more favorably than the healthcare providers scored themselves.

The use of the design-thinking methodology within healthcare also has its proposed limitations. Altman et al. (2018) performed a scoping review of the previous use and effectiveness of this methodology within healthcare, and although they found multiple examples of success across various settings, they also concluded that tensions may occur when using design-thinking within this domain.¹⁴ Specifically, tensions may exist between balancing what users state they want and what researchers believe to be beneficial based on their own expertise and the existing literature. One possible way to prevent this is by ensuring that a needs assessment that is in keeping with design-thinking is used by including observational data, interview strategies and by paying the appropriate attention to brainstorming, ideation, and prototyping.¹⁴ Another tension that exists with the use of this methodology within healthcare is that the risks are inherently higher when human morbidity and mortality are at stake, which may cause reluctance amongst innovators to test prototypes that could possibly fail, in turn constraining the iterative prototyping cycle.¹⁴ Lastly within Canada, where this research is located, certain financial limitations exist within the publicly funded healthcare system that do not in other privatized industries. These limitations may restrict the spectrum of possible solutions to those that strike the ideal balance between showing benefit and cost effectiveness and resource sustainability.

In the final two phases of our study, we will explore the ideation and implementation spaces of the design-thinking methodology. We plan to collaborate with patients and other unit stakeholders, including medical, nursing, and allied health staff to innovate pragmatic, patient-centered prototypes in an attempt to solve some of the deficiencies that we discovered. Then, through an iterative action cycle, we aim to rapidly create, employ, and assess the impact of these prototypes until effective and sustainable solutions are found and fully integrated, thus enhancing the patient experience on our unit. Lastly, we plan to repeat our quantitative and qualitative data collection methods, ultimately demonstrating the effectiveness of our solutions. We hope to present the results of the final two phases of this research in future work. Subsequent research could also involve further exploring the discrepancies we found between the nurse and physician CPES-IC results and those of the patients.

Conclusion

Patient experience is an important healthcare quality indicator, and healthcare teams should prioritize understanding and enhancing it. The design-thinking methodology may be one way to translate information on patient experience into actionable solutions to improve it. We endeavor to further explore this methodology in an effort to solve some of the issues we discovered with our research and hope to present our results in future work.

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Appendix A

Canadian Patient Experiences Survey- Inpatient Care

Your Care from Nurses

1. During this hospital stay, how often did nurses treat you with courtesy and respect?

- Never
- Sometimes
- Usually
- Always

2. During this hospital stay, how often did nurses listen carefully to you?

- Never
- Sometimes
- Usually
- Always

3. During this hospital stay, how often did nurses explain things in a way you could understand?

- Never
- Sometimes
- Usually
- Always

4. During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?

- Never
- Sometimes
- Usually
- Always
- I never pressed the call button

5. During this hospital stay, how often did doctors treat you with courtesy and respect?

- Never
- Sometimes
- Usually
- Always

6. During this hospital stay, how often did doctors listen carefully to you?

- Never
- Sometimes
- Usually
- Always

7. During this hospital stay, how often did doctors explain things in a way you could understand?

- Never
- Sometimes
- Usually
- Always

The Hospital Environment

8. During this hospital stay, how often was your room and bathroom kept clean?

- Never
- Sometimes
- Usually
- Always

9. During this hospital stay, how often was the area around your room quiet at night?

- Never
- Sometimes
- Usually
- Always

Your Experiences in this Hospital

10. During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or the bedpan?

- Yes
- No – If No, go to question 12

11. How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?

- Never
- Sometimes
- Usually
- Always

12. During this hospital stay, did you need medicine for pain?

- Yes
- No – If No, go to question 15

13. During this hospital stay, how often was your pain well controlled?

- Never
- Sometimes
- Usually
- Always

14. During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?

- Never
- Sometimes
- Usually
- Always

15. During this hospital stay, were you given any medicine that you had not taken before?

- Yes
- No – If No, go to question 18

16. Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?

- Never
- Sometimes
- Usually
- Always

17. Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?

- Never
- Sometimes
- Usually
- Always

18. After you left the hospital, did you go directly to your own home, to the home of someone else's home or to another health facility?

- Own home
- Someone else's home
- Another facility? – If another facility, go to question 21.

19. During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?

- Yes
- No

20. During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left hospital?

- Yes
- No

Overall Rating of Hospital

21. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

22. Would you recommend this hospital to your friends or family?

- Definitely no
- Probably no
- Probably yes
- Definitely yes

Your Arrival at the Hospital

23. When you arrived at the hospital, did you go to the emergency department?

- Yes- if yes, go to question 26
- No- if no, please continue below

24. Before coming to the hospital, did you have enough information about what was going to happen during the admission process?

- Not at all
- Partly
- Quite a bit
- Completely

25. Was your admission into the hospital organized?

- Not at all
- Partly
- Quite a bit
- Completely

- Go to question 30

- Answer questions 26 to 29 only if you were admitted through the emergency department

26. When you were in the emergency department, did you get enough information about your condition and treatment?

- Not at all
- Partly
- Quite a bit
- Completely

27. Were you given enough information about what was going to happen during your admission to the hospital

- Not at all
- Partly
- Quite a bit
- Completely

28. After you knew that you needed to be admitted to a hospital bed, did you have to wait too long before getting there?

- Yes
- No

29. Was your transfer from the emergency department into a hospital bed organized?

- Not at all
- Partly
- Quite a bit
- Completely

- Continue with question 30

During Your Hospital Stay

30. Do you feel that there was good communication about your care between doctors, nurses and other hospital staff?

- Never
- Sometimes
- Usually
- Always

31. How often did doctors, nurses and other hospital staff seem informed and up-to-date about your hospital care?

- Never
- Sometimes
- Usually
- Always

32. How often were tests and procedures done when you were told they would be done?

- Never
- Sometimes
- Usually
- Always
- I did not have any tests or procedures

33. During this hospital stay, did you get all the information you needed about your condition and treatment?

- Never
- Sometimes
- Usually
- Always

34. Did you get the support you needed to help you with any anxieties, fears or worries you had during this hospital stay?

- Never
- Sometimes
- Usually
- Always
- Not applicable

35. Were you involved as much as you wanted to be in decisions about your care and treatment?

- Never
- Sometimes
- Usually
- Always

36. Were your family or friends involved as much as you wanted in decisions about your care and treatment?

- Never
- Sometimes
- Usually
- Always
- I did not want them to be involved
- I did not have family or friends to be involved

Leaving the Hospital

37. Before you left the hospital, did you have a clear understanding about all of your prescribed medications, including those you were taking before your hospital stay?

- Not at all
- Partly
- Quite a bit
- Completely
- Not applicable

38. Did you receive enough information from hospital staff about what to do if you were worried about your condition or treatment after you left the hospital?

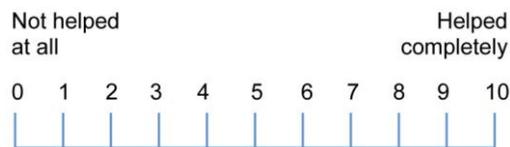
- Not at all
- Partly
- Quite a bit
- Completely

39. When you left the hospital, did you have a better understanding of your condition than when you entered?

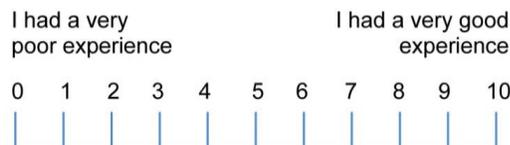
- Not at all
- Partly
- Quite a bit
- Completely

Your Overall Ratings

40. Overall, do you feel you were helped by your hospital stay? Please answer on a scale where 0 is “not helped at all”, and 10 is “completely helped”.



41. Overall... (Please circle a number)



About You

42. In general, how would you rate your overall physical health?

- Excellent
- Very good
- Good
- Fair
- Poor

43. In general, how would you rate your overall mental or emotional health?

- Excellent
- Very good
- Good
- Fair
- Poor

44. What is the highest grade or level of school that you have completed?

- 8th grade
- Some high school, but did not graduate
- High school or high school equivalency certificate
- College, CEGEP, or other non-university certificate or diploma
- Undergraduate degree or some university
- Post-graduate degree or professional designation

45. What is your gender?

- Male
- Female
- Other

46. Was your most recent stay at this hospital for a childbirth experience?

- Yes
- No

47. The following question will help us to better understand the communities that we serve. Do you consider yourself to be...

(Check all that apply)

- White
- Chinese
- First nation
- Inuit
- Metis
- Indigenous/aboriginal (not included elsewhere)
- South Asian (East Indian, Pakistani, Sri Lankan, etc.)
- Black
- Filipino
- Latin American
- Southeast Asian (Vietnamese, Cambodian, Malaysian, Laotian, etc.)
- Arab
- West Asian (Iranian, Afghan, etc.)
- Korean
- Japanese
- Other

48. Is there anything else you would like to share about your hospital stay?

Appendix B

Modified Canadian Patient Experiences Survey- Inpatient Care (Nursing Version)

1. During this past month, how often did you treat patients with courtesy and respect?

- Never
- Sometimes
- Usually
- Always

2. During this past month, how often did you listen carefully to patients?

- Never
- Sometimes
- Usually
- Always

3. During this past month, how often did you explain things to patients in a way they could understand?

- Never
- Sometimes
- Usually
- Always

4. How often did you respond to patient that used their call buttons to give them help as soon as they wanted it?

- Never
- Sometimes
- Usually
- Always
- I never pressed the call button

Modified Canadian Patient Experiences Survey- Inpatient Care (Physician Version)

1. During this past month, how often did you treat patients with courtesy and respect?

- Never
- Sometimes
- Usually
- Always

2. During this past month, how often did you listen carefully to patients?

- Never
- Sometimes
- Usually
- Always

3. During this past month, how often did you explain things to patients in a way they could understand?

- Never
- Sometimes
- Usually
- Always

Appendix C

We would now like to ask you a few simple questions about your experience as a patient here on Unit 36. You do not have to answer any questions you do not want to, and there are no consequences to you if you do not wish to answer any questions. You can also end this part of the study at any time, just let us know you wish to stop.

Do you have any questions before we begin?

1. The first question I have is can you tell me a little about your experience as a patient here on Unit 36?
2. What are some of the things that made your stay a little easier or better here on Unit 36?
3. What are some things that frustrated you about being a patient here on Unit 36?
4. What could we do differently to improve care for patients like yourself on Unit 36?
5. Did you have any trouble with getting help when you used the call bell? Did it take long?
6. Tell me a bit about the noise level. Day? Night?
7. Has pain control been a big issue for you?
8. Do you have a good idea of the possible side effects of any new medicines started during this hospital stay?
9. Do you think your care team (doctors, nurses, etc..) have good communication about your care?
10. Did your care team seem well informed and up to date on your care?
11. Is there anything else you want to discuss?

Thank you for participating in this study. If you have any questions, please contact myself or any member of your care team and we will ensure a member of our research team gets in touch with you.