PATIENTS *first!*

- A RESEARCH STUDY ON PATIENT SAFETY -

EMILY CARR UNIVERSITY

emily carr
university of art + design

Health Design Lab

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PROJECT INTRODUCTION

In September 2013, Fraser Health approached the Health Design Lab at Emily Carr University of Art + Design to consider the problem space of increasing overall patient engagement in their own healthcare, with the preliminary goal of increasing patient safety in hospitals.

The Health Design Lab is a research centre that applies design thinking to healthcare. Situated within the school's general research area, Intersections Digital Studios, the Lab is committed to providing design opportunities to students and faculty through collaborative partnerships that apply solution-focused, human-centred research methodologies to complex problems in health care. The Lab's work is practical, evidence-based, and outcomes are focused on strategies and products that can be implemented in the real world.

As BC's largest health authority, Fraser Health serves over 1.6 million people. With services ranging from acute care hospitals to smaller, community-based structures, Fraser shares with healthcare institutions everywhere the challenge of keeping patients in hospitals safe from falls, infection, medication, and other errors. Having already explored and instituted many initiatives towards this goal, the forward thinking advisory board, led by their CEO, Nigel Murray, challenged the Lab to consider this problem from an outside perspective, using different tools and processes.

Jonathan Aitken and Deborah Shackleton, together with alumni Daisy Aylott and 12 student research assistants, formed the team that considered this problem. They began by conducting a standard review of the literature from several perspectives. This included: a general survey of hospital safety and adverse events; what other initiatives have been undertaken globally to address the problem; whether other institutions have tried to effect systemic change, and if so, the problems encountered; and issues around designing for this specific culture.

Proceeding from this phase, the team began primary, human-centred research which entailed the following:

- A public co-creation session, with approximately 62 participants.
- An ethnographic probe with patients regarding their hospital experiences, including their thoughts and ideas, as well as their emotions and impressions of their stay.
- A series of 6 co-creation sessions. Each session comprised 15 to 20 participants made up of staff, physicians, union representatives, and members of the Patient Advisory Council from 2 sites

(Abbotsford Regional Hospital and Cancer Centre and Eagle Ridge Hospital).

From this evidence-based context, students were encouraged by Fraser to imagine widely and without constraint, looking for genuinely fresh approaches to the problem space. At the completion of this phase, members of the Fraser Health advisory board joined Emily Carr students in an exploratory critique of the work, generating even more ideas. With great input from the board, the team focused and refined their thinking, and these results are presented here in Section 3: Design Outcomes.

The project has provided a fascinating opportunity to consider a complex, inter-connected problem, and the solutions proposed here are certainly not expected to be the final word on the issue. The only way to institute any long term, effective change is to shift a culture. And healthcare is no exception. The patient demand for a greater role in their healthcare is by no means widespread—indeed many patients would prefer to cede their own care to experts. And while many healthcare professionals welcome this shift, here too, there are many who would resist the change. Yet with increasing digitization of health through a plethora of apps and many newly available inexpensive sensors and monitoring devices, this change is inevitable. As reflected on by e-patient Dave at the BC Quality Forum 2014 in Vancouver [keynote speech, David deBronkart, BCPSQC Quality Forum 2014, Vancouver BC, Feb 27, 2014] when an industry become digitized, change happens incredibly quickly. In this project, Fraser Health's vision and Emily Carr's innovation are important contributors to the emerging dialogue about how this change might effect a positive cultural shift in healthcare, where patients are considered first in a true partnership with their healthcare providers.

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Secondary Research
literature review,
best practices,
precedent summary

Emily Carr's Health Design Lab and Fraser Health collaborated on a research and design project considering patient engagement in healthcare—specifically on increasing patient safety in hospitals. Fraser Health asked the Health Design Lab to provide a fresh perspective to help uncover and design innovative, perhaps even provocative, modes of encouraging a safety culture in their hospital settings.

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INITIAL RESEARCH

There is an abundance of literature around patient safety; our team was lucky to have such excellent articles to learn from and adapt to our project brief. We began our project with a fast overview of many articles directly related to patient safety; these articles helped us gain a standing within the project space and be able to understand the current situation.

This initial research was compiled and examined to understand the main factors involved in promoting patient safety inside hospitals. We looked at three categories generally acknowledged to be the main problem areas in patient safety: falls, medication errors and infection control, and found that handwashing, or the lack thereof, is a major contributor to the spread of infection. We found that patients are not always willing to speak up, and this was in need of a major culture shift. Around this idea we also looked at routine, and how something that was already initiated may help both patient and care giver succeed in reducing infection control.We were also well aware of the stigma around patient, doctor and nurse authority and looked at the level of comfort across all authorities and patients. With respect to hospital falls we looked at what the facilities could provide for patients to help them reduce the number of incidents. We also looked at the idea of hospitals providing tools and information that could be easily accessible and also if hospitals could provide equipment for patients in need. For medication we looked at how much a patient should know and whether they want to be involved; should patients understand the side effects and/or should they fully understand their medication or is that a responsibility of the care team?

After compiling our information we looked at a theme for this information and landed on the idea of summarizing this information around the words “Patient Centered,” “Informed Therapeutics,” and “Proactive Patients.” With these words in mind, we made suggestions for moving forward in this direction. We looked at web-based communities (social networking, video sharing, blogs etc) that could help circulate the interactive sharing of information in a user friendly way. We also looked at in-hospital experiences and the current system in place: we looked at items such as brochures/tools and campaigns. We next looked at how size, texture and placement mattered to patients and whether or not that had an impact. Our team knew the importance of putting the patient first and found precedent examples that placed the patient at the forefront, and as someone involved in their care and health decisions. A driving force in our research and subsequent design was the notion of a patient in charge of his or her own healthcare as an empowered, strong and comfortable patient.

LITERATURE REVIEW

The New Brunswick Health Association: It's Your Health, Be Involved

The New Brunswick Healthcare Association (NBHA) has a program called *It's Your Health, Be Involved*. The primary goal of this program is to help patients become more involved in their healthcare. Caregivers at the NBHA want patients to ask themselves "What is my health problem? What do I need to do? Why do I need to do this?" (New Brunswick Health Association, 1). This is supported by the idea that caregivers think that patients know more than they actually do regarding their healthcare. It is important that patients are not afraid to share any concerns they have, making sure they have their questions answered, and to not be afraid to ask for help regarding anything to do with their care plan. We can learn from this by understanding that not all patients feel comfortable asking for help, and that patients may or may not understand the severity of not knowing their own medical information/ plan. The NBHA is attempting to reduce the risk of infection, which is heavily reliant on all patients, visitors and caregivers washing their hands (2). As germs are carried by every person, it is important for the patient to speak up and ask the people around them to wash their hands, including caregivers and visitors. In addition to reducing the infection rate, the researchers focused on avoiding medication errors, which relied heavily on patient education of current medication lists and also making sure that the caregiver fully identified the patient by wristband and contact information including full name (4). Errors are somewhat inevitable, but we can reduce the frequency with which they occur; if the caregiver and patient work together, unnecessary complications can be avoided. To help prevent falls, the NBHA suggests that the patient takes preventative action towards their own safety. Patients should always ask for help when in need of standing up, and should take precautions such as wearing proper footwear (4). Not all patients are aware of how important it is to ask for help, indeed they may feel a burden asking, but the importance can not be undervalued. Patient safety is a high priority for New Brunswick's Regional Health Authorities, and research shows that patients who take a more active role in their care tend to get better results (2). By working together, patients and care providers can help reduce the risk of the problems stated above, and have a more successful hospital experience.

The study also placed emphasis on the importance of a proper, and safe, discharge from the facility. Patients must receive adequate and clear instruction regarding signs and symptoms to watch for, medication plans and follow-up appointments amongst others. Patient safety doesn't stop at the hospital doors, yet must continue to be considered until the need for care ends.

BC Quality Matrix: BC Patient and Quality Council

The BC Health Quality Matrix by the BC Patient and Quality Council is a framework aimed at providing a common language and understanding about healthcare quality. The BC Health Quality Matrix can be used by healthcare delivery organizations, leaders and practitioners for strategic planning, quality improvement program planning, measurement and evaluation at a program, facility and system-wide level (BC Patient and Quality Council, 1). The BC Health Quality Matrix assesses quality from an individual patient, population and system-wide perspective. The paper notes the following categories:

- Acceptability: where care is respectful to patient and family needs, preferences and values.
- Appropriateness: where care that is provided is evidence-based and specific to individual clinical needs.
- Accessibility: Ease with which health services are reached.
- Safety: Avoiding harm resulting from care,
- Effectiveness: Care that is known to achieve intended outcomes. (2)

Although there are levels of action to be taken to ensure quality, we can learn that patients and caregivers may have different perceptions of what this means. It is important to state that although the patient's wishes must be respected, they must understand that care givers have their best interest at heart, so if action needs to be taken to ensure safety, caregivers must retain the authority to take appropriate action. We can learn from this that patients and caregivers must understand their perceptions of one another, and work together to understand a common goal for their healthcare.

The BC Health Quality Matrix also touches on areas of care such as, staying healthy, getting better, living with illness or disability and coping with end of life.(2) Each one of these categories reflect different stages of a possible outcome. For example, someone who is "staying healthy" may be told to eat greens, and live active to reduce the chance of cancer. Someone who is coping with end of life may be at the stage where only pain medication can help reduce the severity of health problems. Although the category may be the same, the amount of action required is different. We can learn from this that in different stages, it is important to adjust the action of care, and to assess what is best for the patient at each stage. The BC Quality Matrix is used to help create a common language, and the adoption of the Matrix will help BC's healthcare providers and organizations work together towards a common goal of improving the quality of healthcare in British Columbia.

Action Research Study of Patient & Public Involvement in the NHS, 2010

The Action Research Study of PPI in National Health Service, UK 2010 is an action research study that aims to explore how Patient and Public Involvement (PPI) can influence healthcare planning and decision making in the NHS. It uses an action research methodology, a document review, semi-structured interviews and AR team meetings to tackle the subject. The objective was to "explore, interpret and obtain a deeper understanding of the views and perceptions of staff within an NHS organisation and identify the attributes and enablers that facilitate PPI to influence planning and decision-making"(Turner, 3). Although PPI has been a major part of the NHS for the past 30 years, it has had very little influence over healthcare planning and decision making. The research points out that there is a "'brick wall' between the outputs of PPI and the outcomes in terms of influencing change in healthcare planning (Commission for Health Improvement (CHI), 2004, 2). What we can learn from this is that patients do not always want the responsibility in their healthcare decisions and that a 'brick wall' can sometimes stand between what we think they need and what they really want/how much they want to get involved. This study considers how the NHS can demolish this brick wall between the outputs. Because there is a brick wall between PPI and changes in healthcare, the research shows that any change will fall in the way of promoting new ways to involve actions and enablers in the process, which is the link between outputs and outcomes. What we can learn from this is that by involving users and care givers during planning and development, there is less risk of providing inappropriate services and more chance of services being provided in the way people want them. This can be supported by the study that included a group of West Norfolk Primary care members that was carried out with 46 individual PPI projects in specific areas. From the 46 groups, 20 did not report change as a result, although it yielded prolific PPI acitivity, there was little evidence of influence planning and decision-making being the final outcome (145). We can see that there is a link between PPI activity and producing viable outcomes; from this we can understand the need for a better connection between patient wishes, expectations and requirements, so the patient and the healthcare team can understand how to work together to achieve higher involvement of patients in their healthcare decisions.

Patient Empowerment by Electronic Health Records: First Results of a Systematic Review on the Benefit of Patient Portals

Patient Empowerment by Electronic Health Records: First Results of a Systematic Review on the Benefit of Patient Portals by the European Federation for Medical Informatics looks at the emergence of the Internet and of the Electronic Health Record (EHR) and its opportunities for a new and more active patient role (Ammernworth Hoerbst and

Schnell-Inderst, 68). The term for patients getting more involved in their healthcare is referred to as "patient empowerment" which describes a situation where the patient's role is changing from a "patronized patient to an informed patient and further to a responsible, autonomous and competent partner in his or her own care" (63). Although healthcare is changing, it is important to state that a patient's role is only as active as he/she chooses to be. One important approach of this study is the concept of "patient portals which can be defined as "provider-tethered applications" that allow patients to access health information that is documented and managed by a healthcare institution (63). A typical example of a patient portal is when a patient is provided web-based access to their EHR with selected clinical data which allows them to read and/or print it. Patient portals may also offer additional services such as medication refills, appointment scheduling, access to general medical information such as guidelines, or secure messaging between a patient and an institution. Although this seems like a very positive solution for patients, there seem to be little evidence as to whether patient portals can really increase patient empowerment. The paper's objective is to review the impact of electronic patient portals on patient empowerment (64). In conclusion, the paper proved that portals provide better information from the medical record to patients. However, better-informed patients are not necessarily healthier patients. We can learn a lot as a group from this statement as to not assume that a patient always wants to be fully involved in their healthcare decisions or responsibilities. It is also important to state that if a patient does not participate, or is reluctant, any push for empowering patients is dramtically decreased. This was supported by five studies analyzed in detail which included between 6-81 patients.(65). The studies showed only a significant change in the patient portal group, compared to a control group, which could only be observed for the following parameters: decrease in office visit rates and telephone contacts [6]; increase in number of messages sent; changes in the medication regimen [6]; and better adherence to treatment. For the other parameters, studies did not find significant changes between the intervention and control group (65). Perhaps electronic records are not the only option in providing patients with support; this will be up to our team to uncover. One must note that descriptive evidence from a large number of studies suggest that patients are interested and very keen to have access to their patient records. These findings, however, do not guarantee that there is in fact a measurable impact. What we can learn from this is that we can not let technology replace humanistic levels of care and that it takes time for people to adapt to new ways of care through technology.

Hospitals push patients to ask, 'Doctor, did you wash your hands?

The article discusses initiatives taken in 17 Catholic Health Partners hospitals to encour-

age patients to request healthcare practitioners to wash their hands. Videos, posters and buttons were implemented within the hospitals in order to create a less intimidating environment for patients to ask about hand washing. Increasing hand washing through performance improvement helps to reduce hospital acquired infections (HAIs). Hand washing is currently a large problem within hospital settings, as it costs nearly $30 billion per year and the lack of doing the protocol is attributed to over 100,000 deaths per year. Although this is a major issue, studies have shown that workers still need to be prompted. Possible explanations for this include doctors "resting authority," workers experiencing dry skin, time pressure and tediousness, or hand washing getting lost when there are more important tasks to be done.

With this precedent, we can learn that patients must be provided with options and opportunities in order to initiate a change in their behaviour from passive to challenging their own healthcare roles. Videos entitled Hand Hygiene Saves Lives were distributed throughout hospitals and were shown to patients during admission. The video depicts two patients asking a doctor to wash his hands in front of them. Posters, buttons reading "Ask me if I've washed my hands" and the verbal encouragement of nurses telling patients to enquire about hand washing have also been used to create a less intimidating atmosphere for patients. The article also notes that people felt more comfortable asking nurses. When patients express their concern and ask about hand washing, it creates a "culture of safety" and assists in the reduction, protection and ultimate prevention of HAIs.

Providing emotional care for patients in a technology-driven health system

Similar to the Advisory Board's patient focused initiative, Alberta Health Services (AHS) has focused on encouraging patient responsibility and engagement. In 2009, AHS developed the Patient Experience department under their healthcare quality and improvement division. Tools and workshops are available across many health related spectrums (e.g. hospitals and long term care facilities) in order to improve patient care through emotional support, patient engagement and patient-centered care. Staff have also conducted research surrounding bettering patient experience and have concluded "actions such as introducing yourself, practicing active listening, sitting or standing by the patient's side" assist in patient comfort.

Currently, relationships with patients are suggested to be suffering because of technology and tests which are relied upon for diagnosis. The issue is integrating new technology with exceptional patient care, to ensure patient well being with "better clinical outcomes." The AHS has since devised a template which outlines basic to advanced levels that healthcare practitioners

can take in order to provide patients with better emotional support. AHS subsequently led eight workshops focusing on positive patient stories for emergency ward staff to experience. Patients illustrated positive stories about when they felt cared for by an emergency provider and in turn allowed the providers to realize their impact on patients. Primary themes that we can take away from this are the importance of focusing on the patient experience when they enter the hospital environment and how healthcare providers interact with patients in relation to the technology that is available around them.

How hospital workers solve patient safety problems on their own

With hospital infections causing between 8,000 to 12,000 deaths per year in Canada, infection control has become a predominant issue within healthcare environments. Hand washing is a prevention technique, yet many healthcare workers are neglecting it. In 2009, Dr. Michael Gardam, under the University Health Network, created a new approach titled "positive deviance," which rejected traditional and informative methods of providing safety information and infection control. It instead requires the involvement of healthcare practitioners in developing their own solutions to current problems.

Gardem explains that traditional models are based on the idea that "knowledge changes behaviour....If that was true, 16 year-old-girls wouldn't take up smoking. They know it's not good for them. There are other reasons why they do it," Gardam said. Unlike the previous articles, Gardem's focus is on engaging the healthcare provider to instigate change in infection control. By allowing the provider to have an opinion in what needs to change, both patients and staff can benefit. Furthermore, this article provides us with the understanding that it is also important to consider holistic input without solely relying on the patient to take responsibility.

Free online course educates about hospital infections

Johns Hopkins University in Baltimore provides a free course entitled The Science of Safety in Healthcare. The course is targeted towards engaging patients and families to become more involved in their healthcare experience. This precedent provides us with the opportunity to possibly consider the development of education and course-based learning that is accessible for both patients and families. Education can provide understanding and knowledge, which can assist in encouraging patient's to take responsibility for their own healthcare.

Safe Care Campaign: Being Safe in the Hospital Environment

The video illustrates a staff member washing their hands before coming into contact with a patient. It encourages patients to request a healthcare practitioner to wash their hands before interact-

ing with them and which areas of the hospital and room are cleaned in order to avoid possible contamination and infection of a vulnerable person. The video firstly explains what the hospital does to ensure cleanliness and infection control and then concludes with what the patient and visitors can do to reduce infection. The 2 minute video is targeted towards patients who enter a hospital and provides knowledge to the patient about what they can do to maintain their own safety. Similar to the Johns Hopkins University piece, we can learn that if patients are given information and knowledge through education tools, they can have the resources to create safer hospital and health-related environments for themselves.

Hospital Safety Score

The website provides the hospital safety score of hospitals within the United States. The rating system allows patients to gain insight into a hospital's safety before visiting. The site may also encourage hospitals to be knowledgable about their own environments and how they are preventing patient-related issues, injuries and overall safety.

Your hospital survival guide: Here's our advice on how to prevent infections, drug mix-ups, unnecessary tests, and other common hospital errors

The guide discusses that patients should take ownership and be their own advocate for their healthcare. It is critical for the patient to be involved, either in planning a hospital visit or long term recovery. The guide begins by suggesting—before you are admitted— to: check hospital ratings, get briefed, make a drug list, schedule surgery when many staff members are on, know heart attack risks, bring a helper, create a healthcare proxy, bank blood, quit smoking (even temporarily), pack a bag and possibly get screened for methicillin-resistant Staphylococcus aureus (MRSA).

After checking in, hand over the medication list, introduce your helper, inquire if there is a patient representative for the hospital, discover who is in charge and check the information on your wristband to make sure it is accurate. The article then advises that during your stay you should monitor your meds, try to prevent infection, avoid unnecessary tests and too much pain relief, move to prevent bedsores, maintain your body temperature while staying alert of your surroundings. After leaving the hospital, talk with a discharge planner, ask if you are ready to go home, get a summary and medication list, request late tests and finally schedule an appointment with your doctor. What we can take away from this, is to provide tools and knowledge that will potentially encourage a patient to be knowledgeable about their own health before, during and after they are admitted to a hospital.

Patient Safety: Ten Things You Can Do to Be a Safe Patient

Recovery time within a hospital setting can put patients at risk for developing healthcare-associated infections (HAIs), which are caused from bacteria, fungi, and viruses and can happen anywhere that medical care is provided. The article then describes tips in order to protect yourself: speak up, keep hands clean, change catheters, ask questions, watch medications, be smart with antibiotics, prepare for surgery, watch for Clostridium difficile (C.diff.) and get a flu shot. This again relates to previous articles that encourage patients to take responsibility for their health when they enter hospital environments.

Elevating the Patient Experience Advancing Towards Person Centered Care

The article discusses sustainable strategies for improving the patient experience amongst patients and their families. The initial step is to create a partnership with patients to reduce barriers by understanding patient expectations, patient perspectives and patient and family participation.

A Practical Handbook on Accessible Graphic Design

The Association of Registered Graphic Design's of Ontario (RDG) have compiled a handbook as a resource for designers to learn about visual information when designing for accessibility. The hand book stemmed from the partnership between the Government of Ontario and RDG titled EnAbling Change Partnership Program to address the issues in accessible design for seniors and people living with disabilities (RGD Ontario, 2). The handbook provides elaborate detail on how designer's can achieve accessible design through clarity and navigation within public spaces. Design for accessibility considers people at both an individual and public level. Individually, a range of different people must be considered. Then as a public group, designers must be able to communicate in the most widely accessible way when designing for all of these individuals combined. This is achieved when design becomes easily understood and accessible for a wide audience.

In relation to designing for patient safety within Fraser Health Authority environments, the handbook acts as a strong reference tool for design interventions that could be beneficial in public environments. The handbook states that important aspects to consider when designing for accessibility are typography, grid, hierarchy and the material or print surface. Print materials must be simple to read with appropriate typographic choices and an accurate grid layout. Contrast and colour are also design elements to keep in mind when we design for the Fraser Health public as colour provides meaning, indication and differentiation. In terms of web design, four principles were suggested to keep in mind: perceivable, operable, understandable and robust. For signage design, which is essential for patient way find-

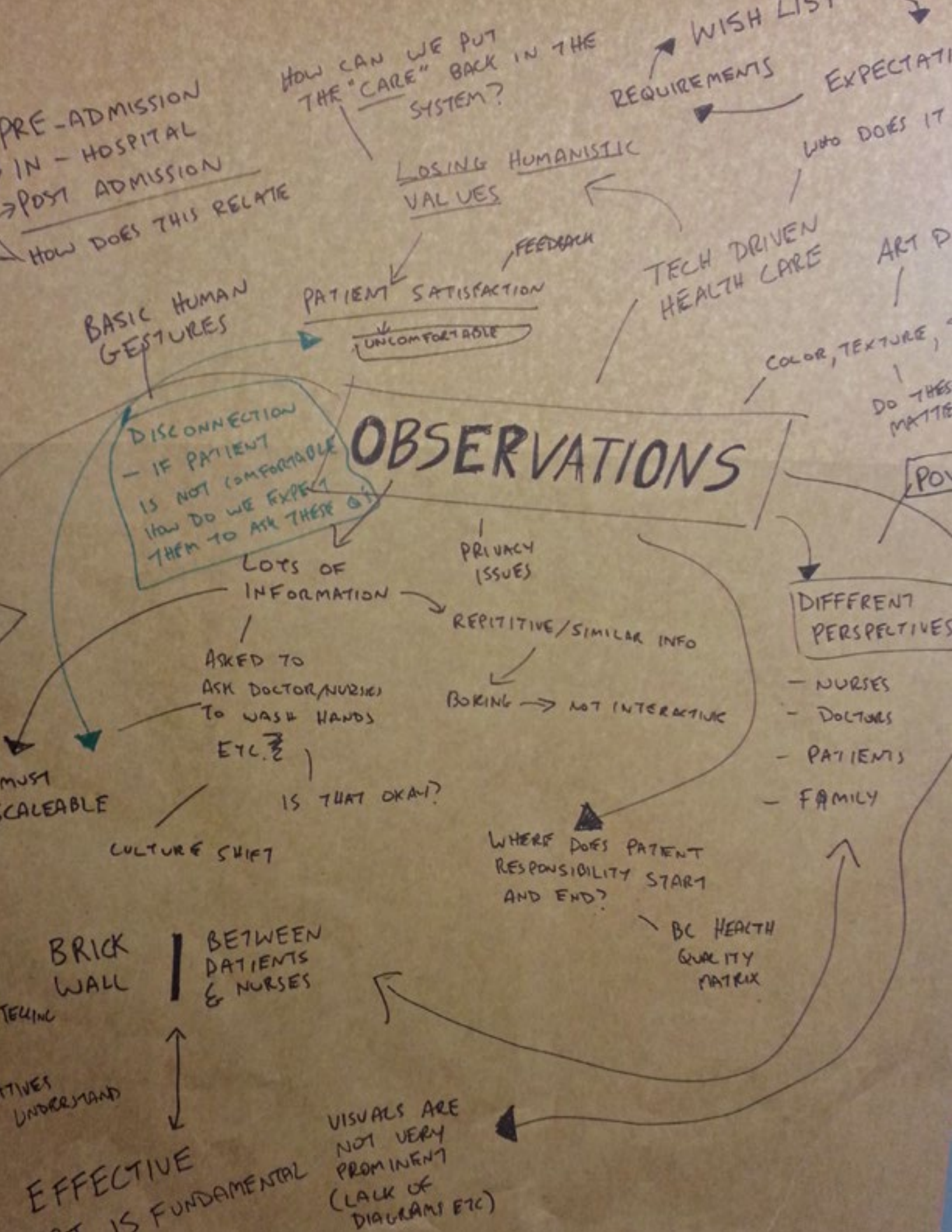
ing and communication within Fraser Health's institutes, it is important for us to consider that written information must accommodate a wide range of users, distance, use on technology, braille and placement.

The Graphic Design of Medication Packaging: Design for Patient Safety

The Helen Hamlyn Research Center conducted a study over one year of how clearly designed packaging impacts patient safety. It is estimated that over 900,000 adverse events occur in the National Health Service (NHS) every year and one third of medication errors are caused by confusion over packaging and labeling instruction, yet a packaging design intervention could provide a solution to reducing these events (National Patient Safety Agency, 7). Clear and readable design can assist patients who are taking medications by providing information on the tablet, an image on secondary packaging of medicine, matching machine readable codes on packaging and dispensing labels, putting small products in larger packaging and a header area away from tablets on blister strips where critical information could remain intact. While designing medication packaging, it is also important to consider the needs and capabilities of the widest range of potential users in their home and pharmacists in terms of how they identify and differentiate packaging. With these points in mind, we can apply each in consideration of the issues that Fraser Health and Canada faces with respect to medication errors. We can also reference the checklist provided in the booklet for addressing certain issues in medical packaging which states various recommended actions for that particular issue. Themes that we would also be able to carry over into our designs include creating information that is easy to read, is consistent with secondary and primary packaging and considers appropriate and safe material choices for a hospital environment.

Interactive Patient Whiteboard

The interactive patient whiteboard developed by the Getwell Network provides patients with access to the industry's first collaborative bedside information tool and the whiteboard itself to allow the patient to become part of the healthcare team. The interactive whiteboard provides patients and healthcare providers with updating information that is accessible and adaptable. It provides communication between each member and answers questions surrounding medication, who a doctor or nurse is, surgery, daily schedules and when discharge is available. It is accessible on both televisions and any size monitor but is mostly used on large screen televisions beside the patient bed. Categories within the interactive whiteboard include: My Team, My Day, About Me along with subcategories including My Schedule, My Day, My Goals, My Doctor, My Nurses, and My Own Bio. Getwell Network's interactive whiteboard provides an essential precedent for us to consider when establishing


PRE-ADMISSION
IN - HOSPITAL
POST ADMISSION
HOW DOES THIS RELATE
HOW CAN WE PUT THE "CARE" BACK IN THE SYSTEM?
WISH LIST
REQUIREMENTS
EXPECTATI
LOSING HUMANISTIC VALUES
WHO DOES IT
FEEDBACK
PATIENT SATISFACTION
UNCOMFORTABLE
BASIC HUMAN GESTURES
TECH DRIVEN HEALTH CARE
ART D
COLOR, TEXTURE,
DO THES MATTE
DISCONNECTION - IF PATIENT IS NOT COMFORTABLE HOW DO WE EXPECT THEM TO ASK THESE Q'S
OBSERVATIONS
PRIVACY ISSUES
LOTS OF INFORMATION
REPITITIVE/SIMILAR INFO
BORING → NOT INTERACTIVE
ASKED TO ASK DOCTOR/NURSES TO WASH HANDS ETC.
IS THAT OKAY?
CULTURE SHIFT
DIFFERENT PERSPECTIVES
- NURSES
- DOCTORS
- PATIENTS
- FAMILY
WHERE DOES PATIENT RESPONSIBILITY START AND END?
BC HEALTH QUALITY MATRIX
BRICK WALL
BETWEEN PATIENTS & NURSES
EFFECTIVE
VISUALS ARE NOT VERY PROMINENT (LACK OF DIAGRAMS ETC)

connections and meaningful interactions between the patient and healthcare provider. By allowing patients and healthcare workers to effectively communicate through options to leave notes or document their personal contacts and feelings, both parties are able to benefit. What we can learn from the interactive whiteboards are that they assist in enhancing bedside communication, they enabled patients, caregivers and families to easily share up-to-date information about the most pressing concerns. They function as an overall collaborative tool to increase patient satisfaction.

Spark: Wifi for Everything

Spark created a small wi-fi development board to easily create internet-connected hardware for any device. It is powered over USB and can control items such as LEDs, switches and motors. People are able to essentially add any product through wireless programming. The programming is designed to be easy to use, allowing the user to have little or no programming knowledge. For Fraser Health's patient safety design initiative, providing patients and healthcare professionals with wifi could allow for the development of accessible screen-based designs.

Health & Wellness: Helping people lead healthy and happy lives through design

Medical products can assist people to live happy and healthy lives through designed products that are advanced in technology. Technological advancements give an opportunity to develop human centered products, services, space and systems and assist in the associated physical and emotional burdens surrounding health and wellness. There is an opportunity for revolutions in prevention, treatment and delivery of treatment through these advancements. The key is to focus on healthcare as a system from prevention through to management by enabling patient responsibility and engagement. By designing enabling experiences for patients to take better care of themselves and their physical, health can be maximized from diagnosis through to personal treatment. IDEO aims to develop ways in which patients can stop being passive and start being personal practitioners in their own care.

Medical Products: Creating tools to humanize healthcare

IDEO addresses issues in healthcare delivery by focusing on the integration of new technology into delivery systems and establishing patient control. By identifying potential opportunities, IDEO prototypes and implements clinical trials and production. One of the key points in IDEO's technology development is to consider and meet the needs of all stakeholders. IDEO also focuses beyond their design by considering the training and adoption after the implementation of a new particular technology. This is something that we must continually keep in mind while designing. We must consider how each eventual design from ideation through to development and through to the eventual outcome will effect each stakeholder involved with Fraser Health as design can impact the patient, family, friends and the healthcare providers.

Stanford Persuasive Technologies Lab

Stanford Persuasive Technologies Lab has a focus on behaviour change and psychology in relation to design. The lab, directed by psychologist Dr. BJ Fogg, focuses mainly on how computing technologies can change people's beliefs and behaviours (Persuasive Technology Lab). However, it offers many resources with advice pertinent to a wide variety of applications. One particularly useful resource was that of the 'Behaviour Model' developed by Fogg. The Model charts the type of behaviour against the term length to develop a 'path' for the designer to follow, and offers insight into the three steps of behaviour change, being triggers, motivation and ability. Fogg used a number of examples to illustrate his work, which made the site comprehensive and succinct. A number of essays accompanied the Persuasive Technology Lab website, many written or co-written by Fogg. One such essay entitled "The New Rules of Persuasion" stresses the importance of simplicity when designing for behaviour change. Fogg states that the six factors that affect simplicity are "time, money, physical effort, brain cycles, social deviances and non-routine" and that the more these factors play a role in the designed experience, the less successful it will be (Fogg, "The New Rules of Persuasion").

BEST PRACTICES REVIEW

Design for Patient Safety is a growing field in research; around the world, healthcare systems are recognizing the need for improvement and development. It is being noted that poor design is a stressor and a burden upon an already pressured health environment, and that we can not continue in this way (Design Council, 30). In order to progress in the realm of health design, one must understand and acknowledge previous work in the field; with this in mind, our team conducted research into four case studies from the United Kingdom and Canada. The Helen Hamlyn Centre for Design at the Royal College of Art has made great progress in new methods of thinking and designing for modern healthcare needs. Two articles based out of this research centre were analyzed, "Circles of Care" and "Make It Better". Again in the United Kingdom, the National Health Service (NHS) has embraced the potential for design whole-heartedly, and has partnered with the Design Council on a research project entitled "Design for Patient Safety". Looking at what is being done on a more local scale, our team took interest in a proposal by the Canadian Patient Safety Institute entitled "The Safety Competencies". The understanding of best practices is an essential component of any research project, this fact alone is stressed in each of the four case studies, which will be summarized in the following sections.

Make It Better

Rather than design from an external position, the Designing Out Medical Error (DOME) team at the Helen Hamlyn Centre for Design worked alongside their future users. Their team was comprised of designers working alongside clinicians, psychologists and business experts– such a diverse grouping paved the way for many co-creation and co-design techniques (Anderson, Davey and West, 4). The project team immersed themselves into the hospital environment; this forming of relationships with staff and patients allowed for open communication around perceived issues. Through an immersive process, the DOME team identified five of the highest risk areas in hospital care, these being hand hygiene, information hand-over, vital signs monitoring, isolation of infection and medication delivery (6). To best assess these risk zones, expert groups were organized to contribute insight and knowledge to each area. Through a collaborative approach, the DOME team was able to uncover the systemic weaknesses of the system (7).

Rather than focus entirely on the hospital system, the DOME team took it upon themselves to explore best practices in all fields with a focus on safety. The team visited "international sites in the mining, chemical, oil exploration, shipping and construction industries to draw lessons on ways to reduce systemic error" (8). Through this process, they were able to identify 4 components present in safety improvement, these being; task design, reminders, equipment and space. This exploration of safety precedents proved essential to the final designs created by the team, which took inspiration from work seen in various industries.

In their research into hand hygiene inhibitors, the team noted a lack of interference at essential points, such as at the bed space, as well as a lack of voice and consistency amongst reminder materials (12). Drawing inspiration from the clear and official safety signage found at construction sites, the team saw the need for a single symbol used for hand hygiene to help unify messaging. Branded materials accompany the symbol; examples of these include 'Wash Before you Cross' bedsheets, and reminder stickers found at the point of care.

The difficulty of information handover between shift nurses is evident in hospital environments. The DOME team noted the lack of a specific handover space for nurses, resulting in frequent interruptions and distractions (18). This lead to the concept of a 'Handover Room' to aid in the process, asking the question; how can an environment support an intended action? The solution is a double-usage space with 2 distinct moods, one for handover and one for regular staff use (19). While in Handover State, the room is brightly lit, has formal seating for up to 10 individuals, is equipped with writing surfaces, and is furnished with signage to reduce interruptions. As a staff

room, the space is more comfortably equipped, with relaxing lighting, comfortable seating and a kitchenette for staff use. This novel approach to improving handover accuracy is a direct response to observed situations.

To reduce the transfer of infection from one patient to another, the team designed an electronic cart system to improve report accuracy and hygiene (17). Elements that may have been overlooked by others were noted by the DOME team, such as the potential dangers of loose or tangled cables and textured surfaces with the potential to trap infection. In response to these dangers, the cart has smooth surfaces that may be easily cleaned with the antiseptic wipes distributed from within the cart itself. By eliminating the extra step of finding a cleaning wipe, the cart is much more likely to be wiped down after use. The reduction of infection was also addressed in the improvement of equipment and material accessibility at point-of-care stations through an 'end-of-bed' care station (10). Having materials readily available at the point of care increases the likelihood of use.

The final touchpoint examined by the team was the distribution of medication, an area vital to patient health and safety. From observation, the team noted the frequency with which nurses were interrupted while handing out prescriptions (14). The design of the pill containers does little to assist a nurse when facing frequent interruption; labels are often unclear and easily misread or mixed up.

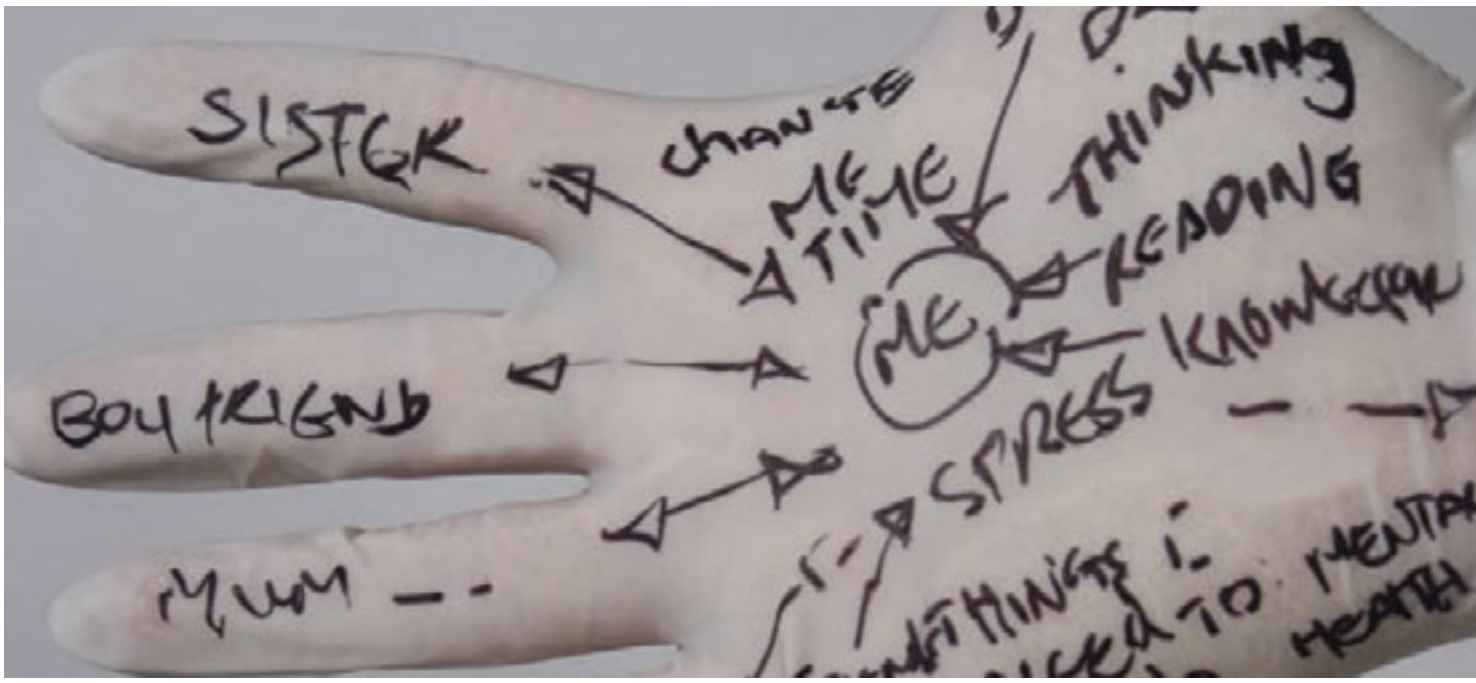
From a patient perspective, the white cup containing a lonely pill offers little information regarding the contents. In addition, patients are not prompted to take an active role in understanding their care. The solution designed by the DOME team is a new system for drug dispersal; a medication pack designed in the shape of a spoon (15). In order to access the pill, one must peel off a label containing all pertinent information. Providing information to the patient will hopefully aid in improving patient engagement and knowledge of care. The patient can thus act as a second pair of eyes to verify that the drug they are receiving is, in fact, the correct one.

The work done by the Helen Hamlyn Centre for Design is a great example of the role design can take in healthcare. Rather than engage design at the late stages of the process, this project proves that design thinking can aid from the very beginning in understanding problem areas. As a precedent for our own work, we can learn from the transition from research to design, and the collaborative approach taken.

Circles of Care

Posing the question "what role can communication and self-monitoring techniques play in helping people maintain a proactive approach to their health and well-being", Circles of Care explores the potential of social networking in

Circles of Care
A shot from a co-creation session held by the researchers behind 'Circles of Care'



improving our health system (Tulusan, 7). As can be seen in every-day interactions, the rising cost of healthcare is pushing individuals to seek care and advice in less obvious spaces. Traditional medicine and natural health methods have become common sources of advice, and individuals rely greatly on online sources and forums for information. The paper suggests a move towards prevention based care rather than a cure centred system, and outlines three universal requirements essential to supporting ones own health on a preventative level; fitness of body, autonomy of mind and relations to others. Circles of Care places great importance in the final of the three requirements - relations to others.

The paper views health as a social activity, and aims to link public, private and volunteer sectors (8). By strengthening and empowering the social networks people already lean on for advice and suggestions, less strain can be placed upon the healthcare system, allowing them to take better care of fewer patients. Design can aid the NHS to reach this goal; it can improve information technology to assist in individual understanding and accessibility of correct information, and "reveal unarticulated consumer concerns" to aid in the bettering of the health system (11, 21).

The main research questions of the project are as follows: how do people maintain their health? what kind of prevention routines exist? what

« The role of the designer is to act as mediator between those who are concerned and involved in their health on a daily basis, and the service provider »

Design Council

sort of networks do people have? and how do these differ between cultures? (14). The researchers became aware of the existence of 'self-care manuals' present in many families; the collection of tips and health-related advice passed down through the generations (19). The research sees potential in celebrating and promoting this kind of networking; trust is an essential factor in healthcare, and this is an element that often comes naturally with family ties. Circles of Care promotes the passing of information and the opening up of new care networks to build a strong community around 'self' care (35). The role of the designer is thus to act as mediator between the conscious well, being those who are concerned and involved in their health on a daily basis, and the service provider (37).

Design for Patient Safety

Studies have shown that in the US, at least 44,000 people die from adverse hospital events each year (Design Council, 26). The case is much the same in the National Health Service (NHS) found in the UK. In order to quell the frequency of these fatal events, the NHS has involved the Design Council in a wide research-design project. A paper written by the Design Council, "Design for Patient Safety" outlines the initial stages of this lengthy partnership, with particular focus on the research methodology.

The Design Council is sure to acknowledge the high stress environment of the hospital, and notes the burden that poor design placed upon an already pressured workload (30). Not only does this act as a stressor, but increases the chance of human error. To improve the design of medical devices, packaging and services, it is vital to understand what makes the current designs 'bad'. A common theme throughout the paper makes note of the importance of simply gaining understanding of the issues that happen; a key element is to identify "hotspots", or high-risk situations, and to act upon them (29). The Design Council hopes to reduce the chance of error, increase the chances of discovering errors, and reduce the harmfulness of errors if they should occur. Key to their research and design is having a solid understanding of the system for which they are designing.

Research has been undertaken not only to pinpoint where mistakes happen, but also to predict potentially dangerous situations (41). While the NHS has a system in place to track adverse events, there is little acknowledgement of potential errors; indeed, staff are not trained to recognize these occurrences (70). It is vital that the NHS take a proactive stance in risk management rather than a reactive one (41). At present, equipment is purchased on a cost-based analysis; the Design Council vouches for a more rounded view, including life-cycle analysis, maintenance costs, training and skill levels required, and of course, room for error (35). If the purchasing process were to become more critical of quality, suppliers would need to react and compete to

deliver value products (66). To help accelerate demand for quality products in healthcare, the paper supports the publishing of international best practices in health services (62). Not only would the research be beneficial to the NHS on an internal level, it would raise awareness as to what can be achieved with a strong and safe healthcare system.

Creating a nationally, and hopefully internationally, recognized safety standards guide would be key to evaluating the effectiveness of a new design (56). In addition, if designers had a standards manual to follow in regard to key visuals, potential errors due to slight, but vital, differences could be alleviated. The Design Council supports greater transparency in health design budgets, in many products, for example, much of the budget goes to branding and marketing rather than design of the product itself (71).

The overarching statement of the paper is of the importance of understanding the design space before entering into it. A careful analysis of the environment will uncover how and where design is needed.

The Safety Competencies

The Canadian Patient Safety Institute note the identification of leading practices in safe patient care as the key priority to improving our health systems (CPSI, 1). This seems to be a common theme amongst the four case studies provided; the acknowledgement of best practices in the field will not only help to pave the way for further development, but can help promote the necessity of change and growth to the public. However, the CPSI notes that much of the change must come from within the very core of the health sector, this being education (2). In a national survey, the team found that patient safety concepts are not overly integrated into university health education programs. They propose to improve this educational base through six domains.

The first domain deliniates the development of a culture of safety, and its application into everyday work (5). The CIPS vouches for an organizational framework that enables a culture of safety to develop, and encourages the constant renewal of knowledge. Through a community that has an active interest in the improvement of patient safety, the system can build from within. The second domain is the building of work teams to create a patient centred experience (9). With clear roles and responsibilities, a shared vocabulary, and an understanding of gaps and overlaps in team knowledge, a working team could be a great asset in the standardization and reliability of safety processes.

Efficient communication is the third domain, and a common theme amongst the case studies. CIPS states that “patients who receive information that is clear and consistent are better able to understand the risks, benefits and possible

outcomes of investigations and treatments, and can thus participate as full partners in their own care" (13). If healthcare workers took care to limit their use of medical jargon when addressing patients, much clearer communication could occur. Education around proper patient communication techniques should take place during university classes to ensure a consistent and clear method is in place.

Domain four deals with the management of safety risks; notably in the design of a healthcare system that anticipates potential error (17). Professionals should be taught to recognize error and risk, and how to report it. An asset to the medical field would be the teaching of "situational awareness"; observing a situation as a whole, "thinking ahead and reviewing potential options and consequences" (18). Care givers should make it a routine practice to cross-check information and investigate mis-matches between current and expected patient state. These routine methods could be effectively taught in initial university lessons.

To best design the hospital environment, we must first understand the factors that shape our decisions and actions (21). This relationship of human and environmental factors is the topic of domain five, suggesting that an environment should support the "achievement of best human practice". Personal health impacts a health providers work; well-being, work-life balance, sleep deprivation all affect how an individual will perform. In addition to human factors, environmental elements such as lighting, sound, technology and ergonomics have great impact. These elements can be designed to promote best practices.

The recognition, response and disclosure of adverse events is discussed in domain six, noting the importance, and difficulty, of disclosing honest facts to a patient. Although bedside manner is already taught at a university level, improvements could be made on the specific discussion of adverse events. Healthcare professionals have a duty to give honest, timely and clear information to patients after the occurrence of such an event, and colleagues must be ready to assist and take over care if necessary. Such simple, yet meaningful, tasks could prove instrumental to the improvement of patient safety and care.

Common threads can be noted throughout all four case studies; the importance of precedent research, understanding the problem space from an internal viewpoint, and using shared vocabulary and methods are only some of the elements we can take from this research. It is important that we use these studies as a reference point for our own designs; we can learn from their successes and failures to assist in our studies.

PRECEDENT REVIEW

Healthcare on the Move Treating Patients in the Community: The Smart Pods Project

The concept of 'localized where possible, centralized when necessary' is a policy that has been increasingly adopted by UK healthcare services, but there remains a lack of enabling and supporting technologies required to facilitate the change towards locally accessible services. Smart Pods is a Royal College of Art (RCA)/Engineering and Physical Sciences Resource Council multi-disciplinary project that explored new mobile treatment solutions to enable Emergency Care Practioners (ECP) to assess and treat more people within the community. (Emergency Care Practitioners are a new group of healthcare professions drawn from a paramedic or nursing background). One of the key discussions that emerged through the project is the debate of policy versus design. Does design dictate strategy (policy) or does policy dictate design? This discussion is relevant to the FHA project as current policies may limit potential design solutions for patient engagement. The notion of shifting services from central facilities back into the community is also relevant to the FHA project. What opportunities are there to improve patient engagement, education and safety through decentralized resources in communities?

Make it Better: Designing Out Medical Error (DOME)

The goal of the DOME project was to understand and map healthcare processes on surgical wards and to establish an evidence base to design equipment and products that support these processes and reduce medical error. The five highest identified risks to patient safety on surgical wards were hand hygiene, information hand-over, vital signs monitoring, isolation of infection and medication delivery. This document outlines insights and proposes solutions for each of these five problem areas. These are good examples of a design project that addresses patient safety, however the solutions are less focused on patient education and engagement and more focused on healthcare professionals.

Design for Patient Dignity

This document outlines a series of design projects that address issues around patient dignity and privacy in the hospital setting. Project 6b proposes the design of a disposable patient table mat that is customized to provide patients with relevant information, in order to improve communication and patient education.

Changing Behaviour by Design: Combining Behavioural Science with Design-Thinking to Help Organization Tackle Big Social Issues

The Behavioural Design Lab is a collaboration between Warwick Business School and the Design Council, uniting behavioural science with design-thinking to help organizations develop innovative solutions based on a better under-

standing of people. This document is really an 'advertisement' for the benefits of combining behaviour science with design-thinking.

How to Help Prevent Healthcare-Associated Infections: A Patient and Family Guide

This is a guide for patients and families that was developed by the Canadian Patient Safety Institute. This is a basic example of educational material that can be produced to inform patients and families about safety. The guide contains useful content for patients and families, although its design is not of high consideration.

Skylight Care Navigator

Skylight's Care Navigator is an advanced, interactive patient care system that follows the patient from pre-admission, during the hospital stay, and through to post-discharge. It is designed to help hospitals occupy patients and also reduce clinical workflow by allowing patient-specific messages and service requests to be delivered to the accurate department. After being discharged from the hospital, the Care Navigator keeps the patient connected to the content for necessary information through links and secure credentials. The system, designed to also involve families in supporting the patient, provides calendar-driven content such as discharge instructions, appointments, diet and exercise videos, and instructions and medication schedules to keep the patient informed and reminded of pivotal events. To effectively bridge the transition of care, condition-specific information received during a hospital stay continues to be made available post-discharge. This gives patients who wish to review educational content the opportunity to clarify their understanding and reduce complications.

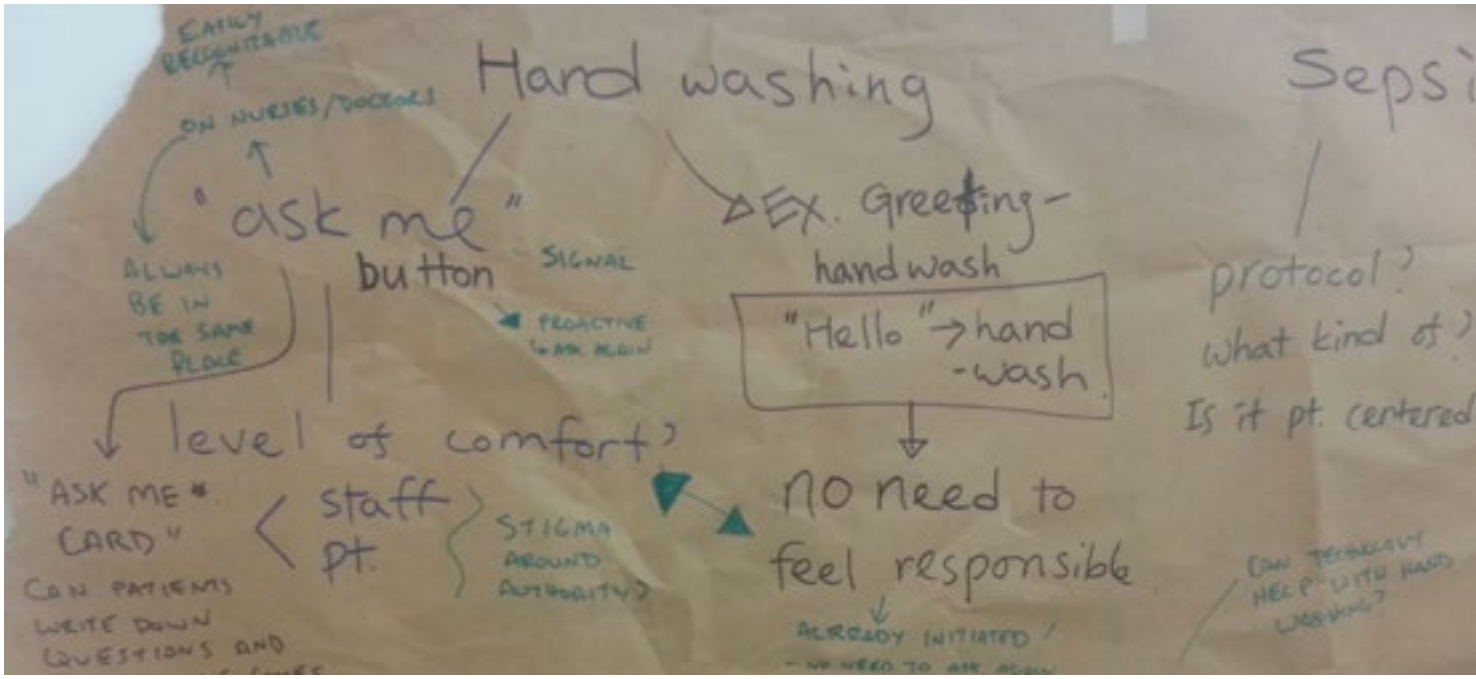
BEST PRACTICES IN PATIENT BRIEFING

In order to design our own patient briefing system, we first researched into existing precedents in the field. One of them, by Matthew Grissinger (Director of Error Reporting Programs at the Institute for Safe Medication Practices in Horsham, PA) communicates the intent of Patient Safety brochures in regard to safety. Patient brochures are one of the most facilitated assets used to enhance patient education in hospitals. Following up on some of the questions of clarity of safety tips, professional assistance in regard to unanswered questions and patient involvement in writing brochures, Grissinger argues that physicians and staff within the hospital may not regularly discuss the published information with patients or offer encouragement to follow the tips within the brochures. To avoid errors within the hospital, Grissinger sees the need for system wide changes wihtin the hospital.

Entwistle, Mello and Brennan's reading, "Advising patients about patient safety: Current initiatives risk shifting responsibility" describes how many healthcare providers now disseminate advisories telling patients what they can do to

Conceptualization

Learning from precedents in the field was an important element of our research



avoid errors and harms while in their care. The reading describes an analysis of five leading safety advisories for patients drawn from published literature and 40 interviews with a diverse sample of 50 key informants. The reality is that very little is known about the effects of the distribution of safety advisories to patients, but several grounds for concern were identified, such as the lack of attention to patients' perspectives during the development of advisory messages. In addition, patients receive little practical support to carry out the recommended actions, and health professionals' responses may render their attempts to act to their own safety ineffective. Some messages suggest an inappropriate shifting of responsibility onto patients. Advice that involves checking on or challenging health professionals' actions appears to be particularly problematic for patients. Such behaviors conflict with the expectations many people have—and think health professionals have—-of patients' roles. Entwistle, Mello and Brennan argue that a serious commitment must be made to optimize patients' contributions to safe care and this may require a research based understanding of patients' perspectives and more of their involvement.

In "Health Expect", Jacklin, Davis, Sevdalis and Vincent mention some of the factors that influence patient participation and engagement. They illustrate the known and putative factors that could affect the participation of the patient in safety issues in their healthcare. Some of these are patient related, illness related, health-care profes-

sional-related, health-care setting related and task related. The excerpt mentions the potential for engaging patients in patient safety, but considers the fact that further research may be needed to examine the influences on patient involvement, and the limits and the possible dangers. It is conclusive that patients can act as 'safety buffers' during their care but the responsibility for their safety must remain with the healthcare professionals.

"Int J Med Inform" by Ruland describes how informatics tools can support shared decision making and risk communication and thereby play an important role in enhancing patient safety. Ruland offers some valuable information about using preference elicitation techniques and knowledge on risk communication. These tools can help patients understand their treatment options and associated short- and long-term benefits and risks, assist in the elicitation of patient preferences, and help patients and clinicians in making treatment choices with the highest likelihood of achieving desired patient outcomes.

"J Digit Imaging" explores and evaluates the feasibility of an iPad-based documented patient briefing for Magnetic Resonance Imaging (MRI) examinations. The process entails a standard briefing sheet and questionnaire converted into an iPad application. The time each patient needed for the briefing and the number of questions that came up was documented as well as the results of the experiment. The results proved that electronic briefing using an iPad is feasible and has the potential to become a user-friendly alternative to the conventional paper-based approach.

Providing safe, quality healthcare to British Columbians is a priority for the Interior Health Authority, as well as all governments, healthcare professionals, organizations, and institutions. The staff work together to improve safety in their facilities and programs and use a province-wide system, BC Patient Safety & Learning System (PSLS), to report events. PSLS helps them identify ways to improve patient safety as well as provides them with effective tools to facilitate reporting and follow-up of events, and automated processes that save time and increase efficiency. In addition, the Interior Health Authority offers ways to get the patient involved in their own safety by following up on three questions which are significant to their health problem, further steps and why those steps are being taken. The questionnaire sheet also contains contacts for communication with doctors and nurses in HealthBC and other networks. The website offers tips and resources on making the best and safest use of medications, safe medication habits and preventative medication error tips. A personal wallet sized medication card may be used within the hospital for medical appointments and visits to pharmacists within the hospital. This record will provide accurate medication information to different healthcare providers who may not be

fully aware of the patient's history, thus providing medical staff with vital information quickly and effectively during an emergency.

Trinita Hospital has been improving patient safety using a number of methods, including a fall prevention program named "Catch a Falling Star", pressure ulcer prevention and infection control practices. Their website offers important safety tips for patients and family members to follow. Alberta Health Services offers helpful tips and suggestions on improving patient safety placing emphasis on the areas of fall prevention, asking questions of healthcare providers, verifying personal information, hand hygiene and knowing one's medication plan.

The Safe Patient Resource Center offers 50 sections of useful information that include safe care tips, educational patient safety videos, advocacy resources, medication dictionaries, downloadable books, brochures and other resources. In addition, there is an interactive iBook and also a free safety app for smartphones. The app allows patients to watch short patient safety videos on the go, while the iBook, entitled "How to Be Safe While Receiving Medical Care" by Victoria Nahum, was written to help patients and their families understand what they can do to prevent medical harm from occurring while in the process of receiving care. There is also included tips, charts and more within the iBook.

We also researched the "Self-Advocacy for Everyone", SAFE Toolkit that has information, tips and resources that can help people learn to be more involved in their healthcare. It consists of key patient safety topics in summary and full version formats, as well as a Leader's Guide. Some topics included are: knowing patient rights, choosing your patient advocate, knowing your healthcare plan, accessing your medical records, fall prevention, patient safety definitions, safety contacts, talking with your doctor and surgery preparation.

The Louise H. Batz Patient Safety Foundation Patient Guide was made as a result of the author's mother's passing due to knee replacement surgery. It acts as a tool for families, medical staff, and patients to help monitor care in real time. In addition to charts for medication prescriptions, the app enables a patient to set alerts and triggers to help remind one of medication times while trying to prevent over dosage or wrong dosage. It also acts as a digital library allowing a person to look up terms with which they are not familiar and is filled with everything from videos and articles to help them learn more about the risks associated with things such as high blood pressure and undiagnosed sleep apnea, to pictures and charts that illustrate how to spot kinked IV lines and unplugged leg compressors. In addition, users can form graphs from their tracked data, allowing the user to take note of changes. This tool could help new doctors to be able to more

quickly identify the patient at risk for sepsis, thus decreasing the likelihood of that person being permanently harmed or killed.

Although there are a significant amount of hospitals that offer tips for patients, we also found resources that aid in assisting hospitals in bettering the experience for patients. Jennifer West and Cassie Sauer from The Association of Washington Public Hospital Districts Washington State Hospital Association gave a presentation on why talking about safety and quality is so important. Their presentation encourages hospitals to proactively educate their staff, board, and community about safety and quality, communicating the great work that they are doing and creating an industry-wide campaign with one voice around patient care and safety.

The Healthcare and Patient Partnership Institute is effective in training hospitals to achieve the stated goals in CMS' Partnership for Patients. It offers ways on how healthcare providers, patients and families can work together to effect safer delivery of care, help realize better expected medical outcomes, reduce risk and liability, reduce medical costs and advance an authentic culture of safety throughout the U.S. These educational all-inclusive training guides provide necessary components for success including a communication blueprint, convenient online modules, ways that the hospital can raise the bar of accountability while lowering financial risk and liability and proven strategies to help hospitals achieve a collaborative plan for safer care and quality improvement.

The Joint Commission has a patient safety program referred to as "Speak Up" that offers a variety of information and tips for patients to find out more about the hospital and their process. Posters and videos cover topics such as speaking up about your pain, knowing your rights, reducing the risk of falling and encouraging children to speak up through animated Speak Up videos. In the videos, the cast of characters encounter everyday situations where they have to read instructions, ask for directions and inspect labels.

2

Primary Research
co-creation sessions, ethnographic probe, collective brainstorm session

PRIMARY RESEARCH SUMMARY

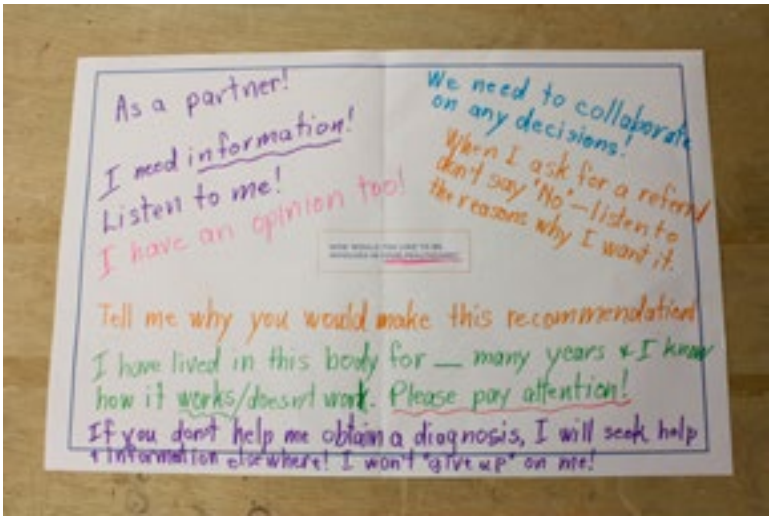
In order to best understand the inner workings of care facilities such as those at Fraser Health, our team took great care in learning from those individuals working in the health field. Rather than design from an outside perspective, we were sure to practice proper design researching methods. These included co-creation sessions with various members of staff and the public, ethnographic probes with current patients and phone interviews with current physicians at Fraser Health. The following section will outline the many aspects of our primary research, and will attempt to offer a comprehensive overview of our findings.

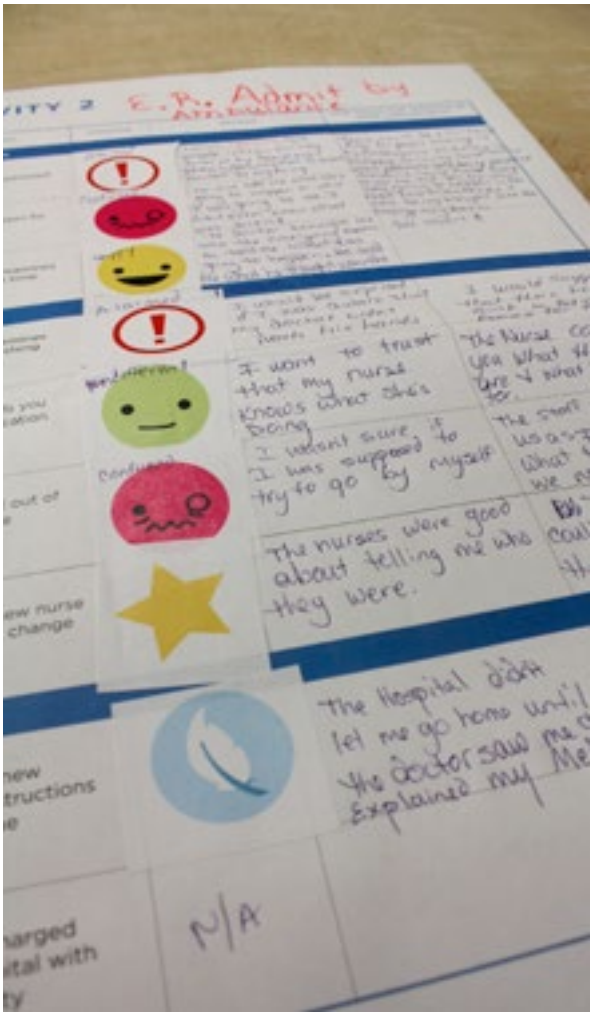
Co-Creation Sessions

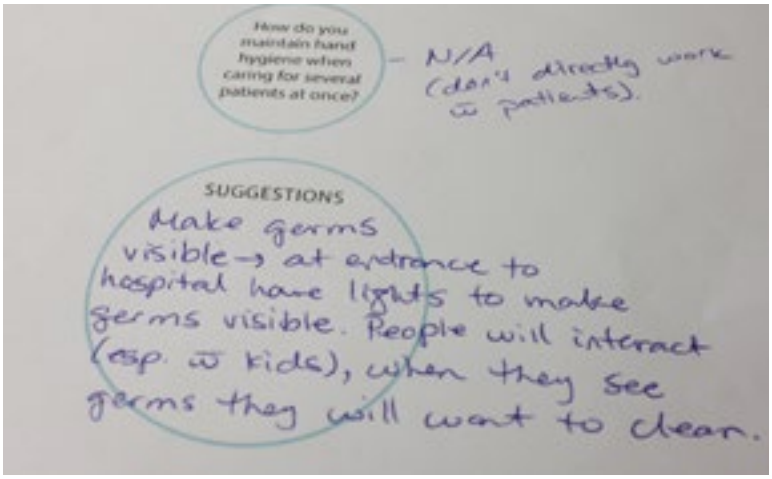
Our team was fortunate enough to be granted access to a number of groups within the Fraser Health community for co-creation sessions. Lasting an hour and a half, these sessions offered great insight into patient safety concerns and thoughts, and we were able to engage in conversations with our participants that had great impact on our design process. We engaged in these sessions with four groups directly related to Fraser Health; Registered Nurses (RN), Licensed Pratical Nurses (LPN), Allied Health Professionals, Managers, as well as members of two Patient Advocacy groups. In addition, we hosted a public co-creation session with over 60 participants; this group was made up of patients, members of the public and Fraser Health employees.

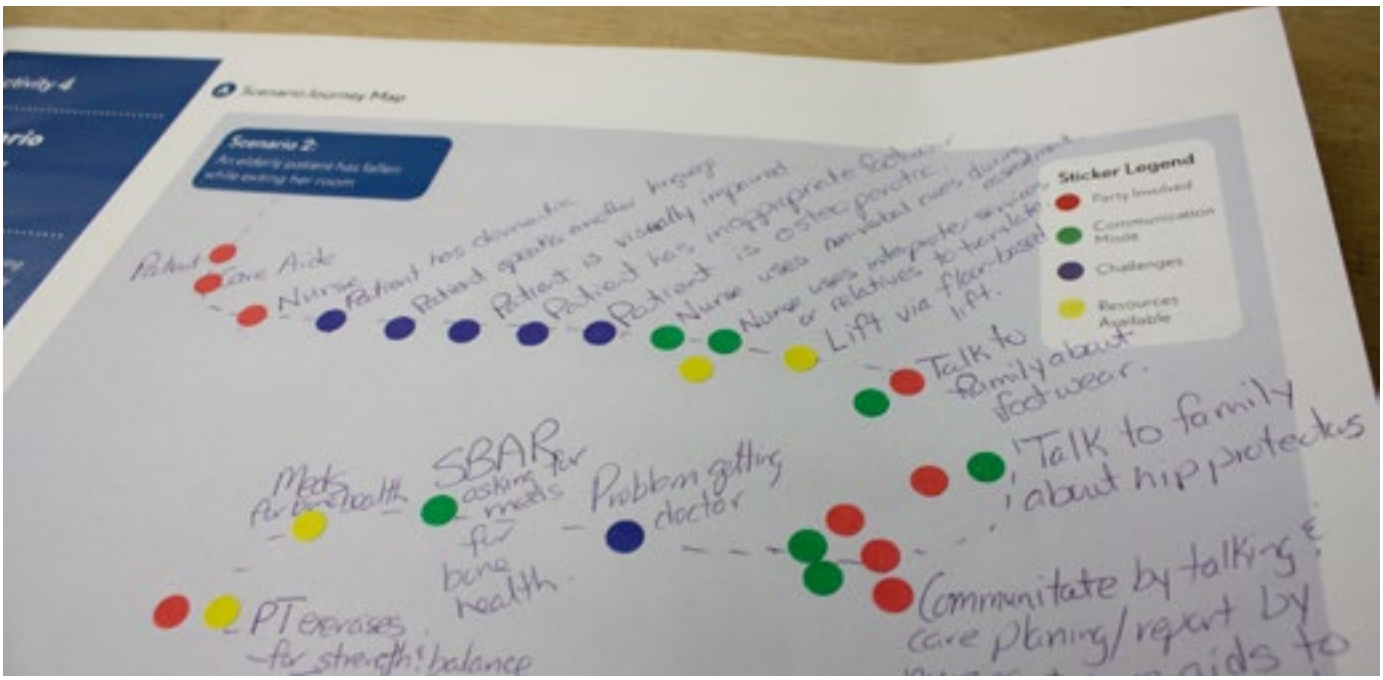
In preparation for the group sessions, our team designed group-specific co-creation kits. Working in teams of two or three, we developed up to five activities per kit that would help uncover thoughts around hospital power dynamics, patient to care provider relationships, hygiene, and medication delivery amongst others. The following will outline the contents and activities of each of the four kits. The kit developed for the RNs and LPNs had a great focus on the patient journey throughout their time spent at a care facility. In addition, three scenarios specific to hand hygiene, medication delivery and falls were outlined, giving participants a chance to share their approach to handling difficult situations. Prior to the sessions, research was done to ensure that our kits were correct in their use of medical terminology and accurately portrayed the hospital environment. The kits used a variety of query methods, including short answer, using stickers on imagery, timeline style maps and collage. It was important for us to provide as many of these methods as possible in order to accommodate for all individuals. Some responded best to the short answer style questions, while others shone during the collage portion of the kit. From over 30 participants, we were able to gain great responses to all of our activities.

The Allied Health Professionals group is made up of Physical Therapists, Occupational Therapists and Social Workers amongst other care providers. As the group was so diverse, we began with an


As a partner!
I need information!
Listen to me!
I have an opinion too!
We need to collaborate on any decisions!
When I ask for a referral don't say 'No'—listen to the reasons why I want it.
Tell me why you would make this recommendation
I have lived in this body for __ many years & I know how it works/doesn't work. Please pay attention!
If you don't help me obtain a diagnosis, I will seek help + information elsewhere! I won't "give up" on me!


I want to trust that my nurse knows what she's doing
I wasn't sure if I was supposed to try to go by myself
The nurses were good about telling me who they were.
The hospital didn't let me go home until the doctor saw me & explained my
N/A


How do you maintain hand hygiene when caring for several patients at once?
N/A (don't directly work w patients).
SUGGESTIONS
Make germs visible → at entrance to hospital have lights to make germs visible. People will interact (esp. w kids), when they see germs they will want to clean.


Scenario Journey Map
Scenario 2:
Sticker Legend
Party Involved
Communication Mode
Challenges
Resources Available
Patient
Care Aide
Nurse
Patient has dementia
Patient gets another injury
Patient is visually impaired
Patient has inappropriate footwear
Patient is osteoporotic
Nurse uses interpreter services or relatives to translate
Nurse uses non-skid mats during assessment
Lift via floor-based lift.
Talk to family about footwear.
Talk to family about hip protectors
Communicate by talking & care planning/report by
Mats for bone health
SBAR for asking for meds for bone health
Problem getting doctor
PT exercises for strength & balance

« Learning from the Experts
Co-creation sessions were a vital source of information and inspiration to our design

activity to introduce each individual's role in the facility; not only did this help us as facilitators to gain understanding about our participants, but helped to 'break the ice' and allow for more open discussion. The second activity used imagery of hazardous situations as a prompt for ideas on how we could improve them. Asking our participants to share their expert advice as to how to improve the situations that they know so well helped to assure the group that we were looking to them for support and advice. From this activity, we gained some very practical design-oriented outcomes. We ended the session by asking participants to create a mood board of their vision for a perfect, and safe, care facility. This ended the session on a great, positive note and opened up space for fertile discussion.

The session with Fraser Health Management was quite different from the previous sessions in that it dealt with a much more external view of patient safety. All previous participants were in direct contact with patients and saw safety issues from a ground level. The outlook on patient safety from the management group was far broader than the specific incidents and anecdotes we had been hearing of prior to this session. This change of perspective was an interesting one, and helped to round out our understanding of the problem space. The session focused on gaining understanding around the managerial perspective of safety; a perspective that observes all incidents and happenings in a facility. An initial activity asked each participant to describe 3 methods that they see as promoting patient safety, asking for keywords and pros and cons for each scenario. Following two short-answer activities, participants were asked to create a personal collage showing their perspective of safety. A wide variety of symbols, colours, words and images were provided to allow participants to explore the term 'safety'. To understand how an adverse event is treated, participants were asked to outline a 'Scenario Journey Map' to trace an incident from its occurrence to resolution. Four scenarios were given, dealing with hand hygiene, falls, medication error and hospital acquired infection. The scenarios enabled our team to gain an accurate understanding of the process for dealing with such an event, and to see where the stress is highest. One activity instructed participants to create their own patient safety brochure using elements of the existing facility materials they considered effective and appropriate. The outcomes offered great insight into what management staff saw as being an effective communication tool. The wide variety of activities and methods of communication were key to the managerial co-creation kit, and helped us to connect with the participants on a number of levels.

Our final co-creation session was held with a group of patients from the Patient Advisory Council at Fraser Health. Their input was instrumental to our understanding of the problem space, and the session was very lively and

productive. Many of the activities focused on the emotional side of their experience as patients; to begin, participants engaged in an individual mood board activity, using words, images and colours to map out their thoughts about patient safety. Words such as hugs, round, impersonal, stiff and bright were provided to participants to maintain a neutral position by offering up all sides of the spectrum. To follow this emotional exercise, participants were asked to use 'emotion' stickers (happy faces, sad faces, symbols indicating time passing etc.) and associate them with various points in the patient journey. This activity narrowed in on individual circumstances, contrasting with the previous method of looking at the situation as a whole. To follow, and to gain understanding around existing versus desired communication methods, participants followed a simple flow chart with short answer questions. A later activity provided existing posters and pamphlets to the group, asking them to evaluate them for effectiveness of delivering a message. To end the session, the entire group worked on a brainstorm map to uncover ways they might wish to be involved in their own care.

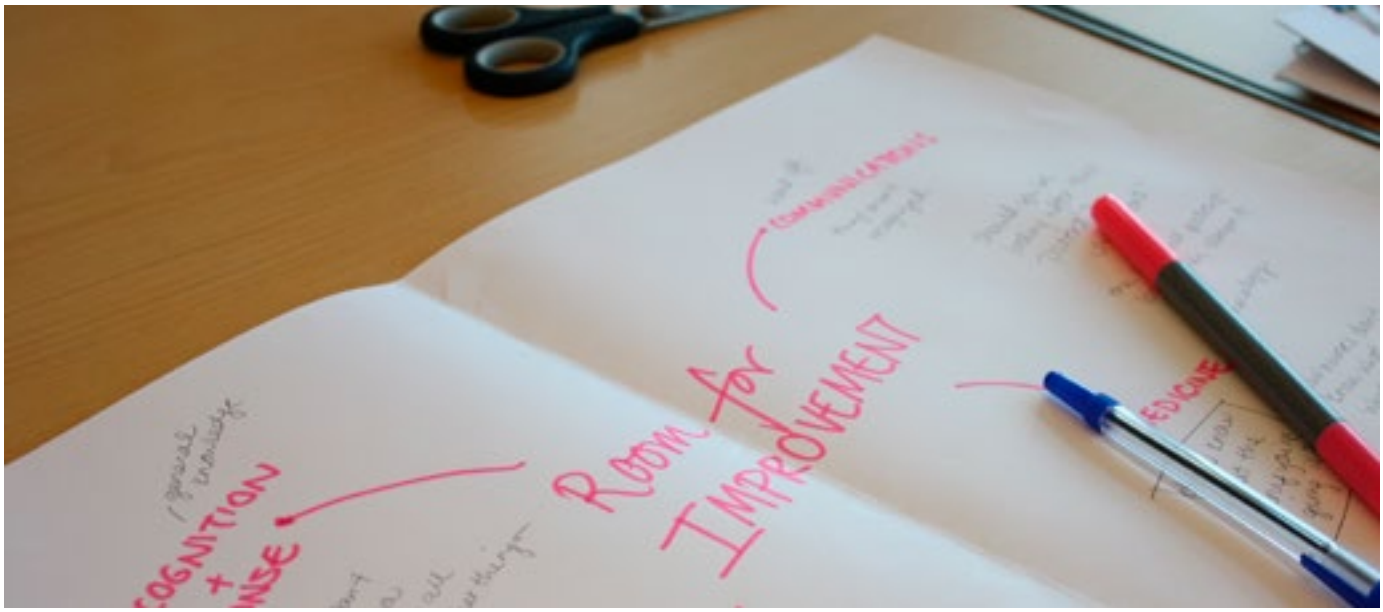
In addition to these private group sessions, our team alongside Fraser Health hosted a public co-creation session with over 60 participants. The session drew activities from previous kits that we had found to be successful at prompting dialogue and ideas. Hosting the public session after all of the private ones were complete was great in that we were able to draw from the successes and failures of previous attempts. Designing a kit for 60 people was no small task, and we endeavoured to make it easy to administer and follow, with a range of group and personal activities. Of the four activities prepared, some groups were so engaged in their work that they barely made it past the first. It was wonderful to see so many individuals sharing their thoughts and ideas around the improvement of patient safety. Beginning with a group mood board, each table of 5 was provided with poster paper and a variety of materials to construct an image/word map of the present state of patient safety. To contrast this start, each group ended the session by creating a group brainstorm map of what the future of patient safety should look like. In between these two activities, participants joined in completing a emotional map of the time spent as a patient, reading and interpreting symbols and safety icons, and uncovering power relationships and comfort levels with various members of the care team. The session was a wonderful way to raise awareness around the role of design in patient safety, and our team gathered an incredible amount of data.

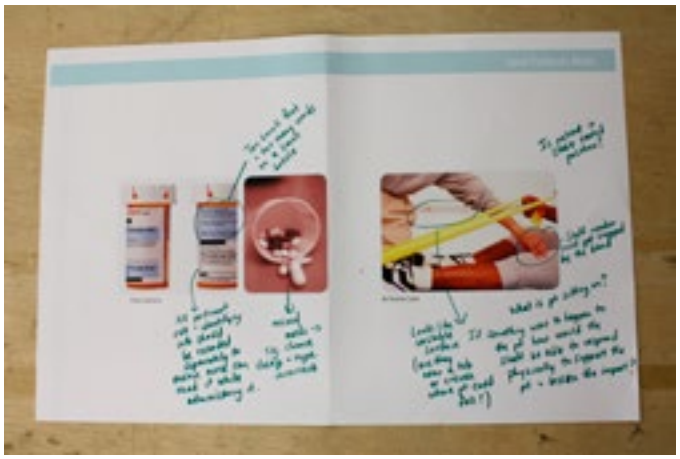
Ethnographic Probe

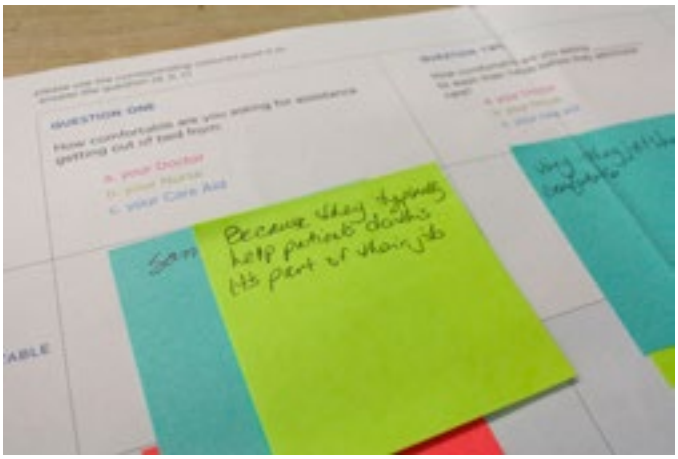
In order to better understand and empathize with the patients, we created an ethnographic probe around the topics of hospital safety and patient experience. Traditionally, ethnographic probes are left with the participant and used to learn more

Room for Improvement

Our co-creation session with Fraser LPNs captures the necessity of change and growth







ETHNOGRAPHIC PROBE

Students were invited to a site visit at Eagle Ridge Hospital and Abbotsford Regional Hospital and Cancer Centre to survey patients about hospital safety and care. Out of the 19 surveyed patients, 10 were from Abbotsford Regional Hospital and Cancer Centre and 9 patients were from Eagle Ridge Hospital.

about their daily interactions through objects and space. Due to the nature of the hospital space and limitations in time, it was not feasible to create a take-home probe. We decided to use an iPad as a platform for facilitating the probe in order to retain an element of interactivity.

The activities in the probe were designed to explore the topic of hospital safety from the patient's point of view in an open-ended way. Many possible activities were brainstormed for the probe and winnowed down to activities that would explore the patient's admission process, relationships with people in the hospital and their level of involvement. The participant's comfort was a key priority and both the app and survey were tested by the ethnographic probe team. The actual process of facilitating the probe run through several times to consider possible scenarios. Activities and questions were carefully considered and phrased to be sensitive to the participant's circumstances.

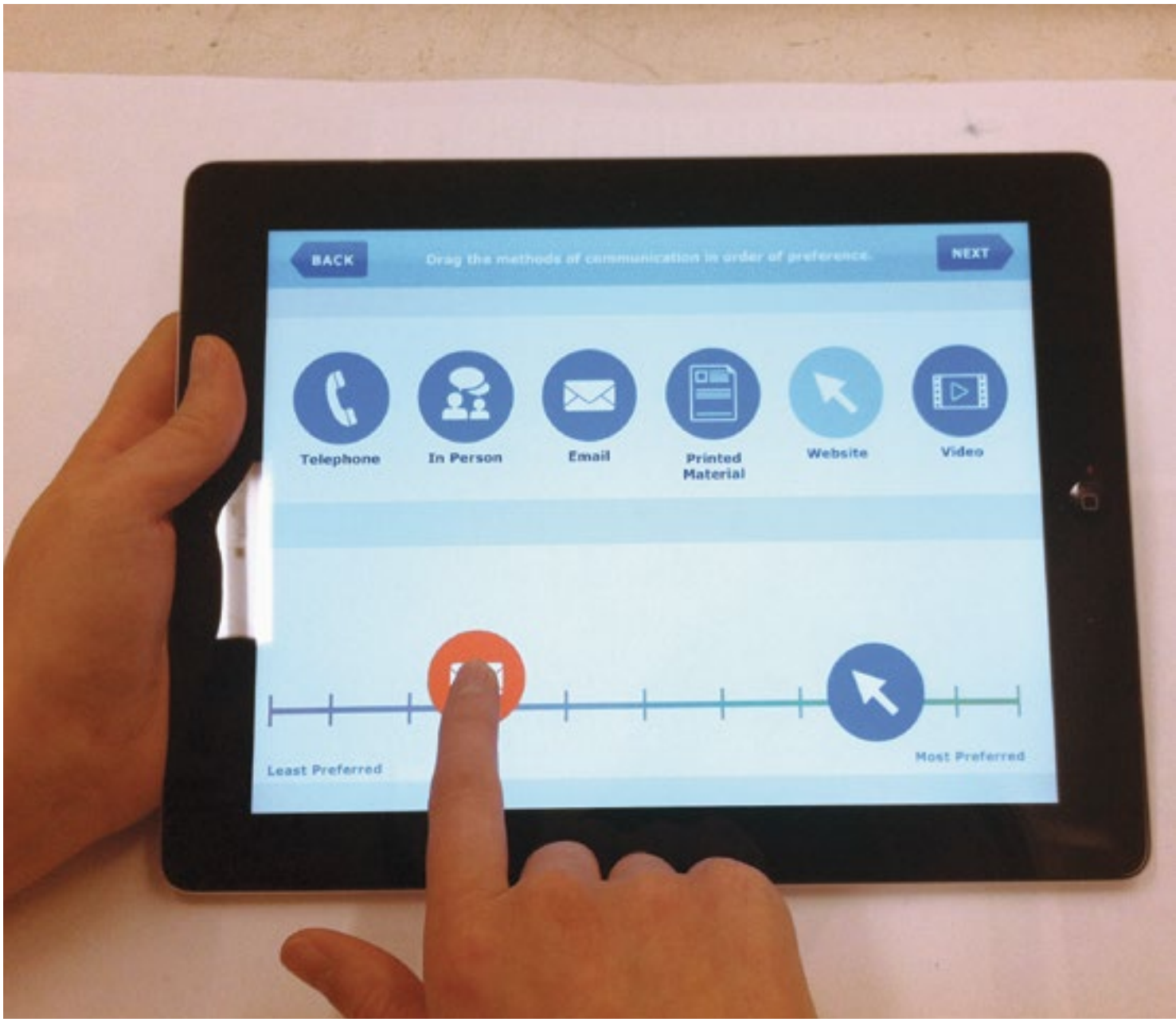
The probe was developed in two parts; one was a native app designed and developed to take advantage of the interactions afforded by the touch screen. The app included icons that could be dragged and dropped onto scales and words that could be dragged around the screen to create associations. The other half of the app was implemented using an online surveying tool called FluidSurveys; which allowed participants to respond using sliders and toggles.

Students were invited to a site visit at Eagle Ridge Hospital and Abbotsford Regional Hospital and Cancer Centre to survey patients about hospital safety and care. The surveys were created to generate feedback from the patient's perspective. Four students formed into teams of two and each team was directed to the acute care wards of the respected hospitals. Out of the 19 surveyed patients, 10 were from Abbotsford Regional Hospital and Cancer Centre and 9 patients were from Eagle Ridge Hospital. Some questions were incomplete as some patients did not want to, or were unable to, continue.

Questions probed for responses about topics such as the process of, before, and during admittance, power relationships, and patient education. As a result of being admitted in emergencies, the patients were not in the condition for patient briefing. In terms of power relationships, patients were asked to select people whom they interacted with daily and select words that best described them or their relationships with each other. From the survey analysis, **93%** of 14 patients felt comfortable asking their nurses to verify their medications, **67%** of 12 patients felt comfortable asking their doctors to wash their hands, **86%** of 14 patients were comfortable asking their doctors for help, and **91%** of 11 patients felt comfortable asking their ill visitors to leave. When the patients were asked about how their nurses, doctors, and visitors would respond to being questioned, **7%** of 14 patients felt that

Ethnographic Probe

Understanding the preferred communication methods of patients



their nurses would respond negatively, **58%** of 12 patients felt that their doctors would respond negatively, and **64%** of 11 patients felt that their visitors would respond negatively. Prior to surveying the patients at the respected hospitals, an assumption was made about the patients desiring ownership of their healthcare. According to the survey results, **57%** of 14 patients felt like they had input in their healthcare and **64%** of these patients did not want to take ownership. Affinity diagrams were then created to organize and summarize feedback from the patients. The feedback was grouped from specific to general topics that contributed to the development of the 10 principles.

Co-Creation Analysis

The co-creation kits yielded wonderful results, informing us of many pieces of information we would not have been aware of had it not been for these sessions. The six group co-creation sessions, the public event and the ethnographic probe provided us with a great deal of data to analyze; a process that was not undertaken lightly. Under the guidance of Deborah Shackleton, our team analyzed each completed kit and probe data. Working in pairs, data was examined and unpacked for its insights. Our process involved careful note taking and diagramming, which was then translated into affinity diagrams. The affinity diagramming process is designed to re-focus ones research through the practice of categorization. Four coloured sticky notes were used to deliniate various stages of the process; green notes describe an overarching area of concern within the work practice of patient engagement and patient safety, pink notes denote specific issues within an area of concern regarding patient safety, blue notes describe aspects of an issue (revealed by clusters of yellow notes) and yellow notes represent a single observation, insight, concern or requirement. A yellow note might refer to an observation, insight, vision (big picture) etc. Beginning by laying out yellow stickies, each team noted specific observations learned during the primary research; for example, one nurse noted the difficulty she had requesting a change of doorknobs in the ward for patients with severe arthritis. This type of direct observation would be noted on a yellow sticky note and placed at the bottom of the chart.

Other yellow sticky notes featured areas of concern such as: hand-washing, fear from power relationships or offending healthcare practitioners, ostracism, issues in privacy and waiting time and a general desire to be more involved in their own health and the healthcare system.

Moving up from the yellow sticky notes, we established broader themes which included: power relationships and the need for change, long wait times, the need for patient privacy, increased communication around medication, the need for knowledge and understanding with simpler words, confusion/negative emotions through lack of knowledge and need for personal

Ethnographic Probe

Screenshots from the iPad application developed for ethnographic testing

consideration and respect (feeling like your voice is being heard), need for comfort and re-assurance and "hospital knowledge," and the need for control/ownership of one's own health and visual communication. Using the pink sticky notes we then broadened the blue note themes in more general terms such as: changing power relationships, better wait times, enhance/improve patient privacy, better communication, negative emotion from lack of knowledge and respect, consideration for patients, communication to allow trust, hospital responsibility, ownership of own healthcare and visual and personal communication.

The final stage of green sticky notes describe the widest themes that we were able to establish as issues that came up when filtering through the patient kit. By dividing the previous yellow, blue and pink notes into themes that reoccured throughout the different activities we focused on what the patients appeared to be desiring. This included: breaking down power relationships, respect of privacy, increased communication (e.g. explanations, knowledge, involvement in their care), addressing negative emotions (confusion, fear), patient respect and consideration, comfort and reassurance, responsibility, ownership, and information/visual communication from the hospital to the patients.

Once the affinity maps had been completed for each of the co-creation sessions and ethnographic probes, our team set about disecting ten overaching principals for our design solution to follow. These ten principles served as a 'checklist' of sorts; when designing, our team was able to refer back to the list and be sure that the original principles had not been overlooked. The ten prinicples were only formed once all seven of our affinity maps had been completed.

Ten Principles of Patient Safety

- Enable partnership (hierarchy as a network)
- Integrate Patient and Family into care team
- Increase accessibility, consistency and relevancy in communication environments
- Involve stakeholders in creating a culture of trust and fulfillment
- Engage patients in their own assessment of health status
- Manage time as a resource for quality
- Develop new habits of behavior around safety
- Develop a culture where patients are empowered
- Create a management system to organize, maintain and source equipment
- Celebrate success

To further develop these ten principles, and to have a better understanding of how they could be applied through design, each of the principles underwent the process of Cognitive Mapping. To begin, the design team brainstormed areas

Affinity Diagramming
Research was re-focused through the method of affinity diagramming, shown below

of concern or of promise relating to each principle. For example, when mapping around the first principle, 'Enable Partnership', the use of language was noted as an area of interest. The thought was further developed into the use of less technical jargon when interacting with patients in order to reduce the hierarchical divide. Common areas of interest amongst all ten principles included the following:

- More consideration for human fulfilment
- Personalized communication
- Simplification of communication processes
- Improved levels of patient comfort
- Patients that feel in control (this also includes feeling empowered through knowledge of one's condition and schedule)

Once this first phase was complete, actionable design concepts were formed around each map. Comfort levels could be improved by encouraging questions between patients and staff; not only would this lead to a greater level of patient knowledge, but would also improve patient to care giver relations. To shift the current language barrier, the use of a consistent and universal visual language was considered. More general improvements were suggested, such as making information and patient resources available at all times, potentially through the use of RFID technology which would provide instant, up-to-date information.

From this mapping exercise, the potential for design became clear; our team saw promise in

PRINCIPLES... ACTIONABLE STYLE

1. enable partnership [hierarchy as a network]
2. integrate patient + family into care team.
3. Increase accessibility + consistency in communication
4. Involve stakeholders in creating a culture of trust + fulfilment
5. To engage patients in their own assessment of heath status
6. Manage time as a resource for quality
7. Develop new habits of behavior around safety
8. Develop a culture where patients are empowered
9. Create a management system to organize, maintain and source equipment
10. Creating a relevant communication environment

« Ten Principles
These design and concept principles were outlined following our research phase findings

Actionable Words
Each of ten principles underwent cognitive mapping techniques to uncover design directions

a number of areas, for example in the development of interactive maps to enable patients to feel comfortable in their environment. Being able to find the nurses station without needing to ask for help would not only help ease staff workload, but wvould improve a patient's sense of empowerment. To deal with the issue of time management, it was suggested to install progress screens for patients, showing wait times and other necessary information. By providing this information in real time, staff can use their time more effectively rather than answering frequent patient questions. Other interactive possibilities were explored, such as the creation of videos to educate patients around different issues or having an online portal to house patient information. While some of the concepts developed are in reality limited by health regulation and current protocol, it was important for us to not limit ourselves, but to ideate freely. The opposing page illustrates two of the cognitive maps developed in our process, the remaining maps can be found in the appendix.

At this point in the process, students had a great deal of potential directions to assist in the improvement of patient safety. To aid in the selection process, staff from Fraser Health were invited to a collective brainstorm session at Emily Carr. Together, the students and Fraser Health staff selected three directions.

COLLECTIVE BRAINSTORM SESSION

Rather than make decisions on behalf of our end user group, we invited Fraser Health staff members to Emily Carr for a collective brainstorm session.

COLLECTIVE BRAINSTORM

After such extensive primary and secondary research, our team compiled quite the list of design concepts. In order to narrow in and elaborate on the appropriate paths, staff from Fraser Health were brought in to a collective brainstorm session; four hours of intensive group discussion and concept generation led to the development of three directions.

Sketches and concepts were grouped into six themed stations:

- Communications
- Patient Empowerment
- Resource Management (time & space)
- Medication Delivery
- Spread of Infection
- Falls and Medication Error
- Patnerships (power relationships)
- Interactive Media

At each station, an Emily Carr student accompanied a Fraser Health staff member to determine the most promising concepts. The following section outlines the concepts presented to Fraser Health within these six categories.

Presented Concepts

Thank You Online Message Board

An online message board could be used in order to provide positive feedback to individuals. The positivity of the messaging on the board could be moderated much in the way that Facebook just has "likes" but no "dislikes" only enabling an "up-vote" of staff. Feedback could also be populated live from twitter. Alternately the staff member being thanked more directly in personalized emails generated through the board to further encourage morale. Additional opportunities within this board would be to broadcast ED wait times or hand hygiene stats. The board could also be leveraged to cycle three key reminders messages every few minutes such as, "Did you get your flu shot?" "Did you wash your hands?". A board format also lends itself to being an interactive information source or kiosk for patients that could integrate with "Healthlink".

Electronic Charting (for staff)

An electronic chart would provide a customizable quick view for workers to understand most pertinent health issues of patients at a first glance. The chart could leverage simplified icons in order to quickly communicate aggressiveness, propensity for falls etc. Within this chart there could be an option to send any results or feedback that exists within the chart directly to the family and support network. Four simple tab menus could be limited to diagnosis, assessment, testes and prognosis.

Electronic Charting (for families)

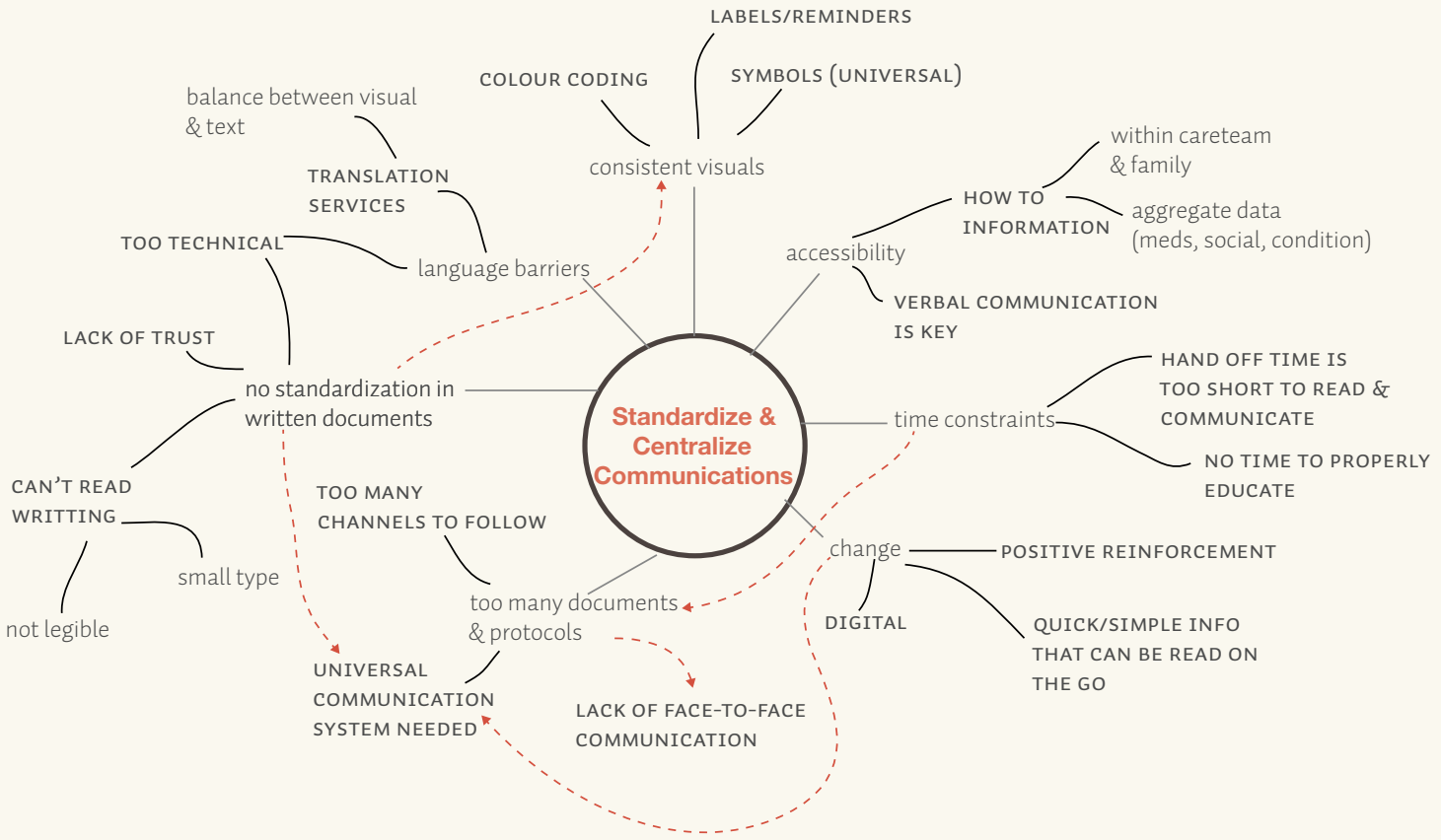
Similarly a family facing electronic chart could have four main tab menus relating to mobility status, medication, care team/care transitions, biohazards, and advanced directives for aggressive behavior. There was mention however of privacy concerns with the family facing eChart.

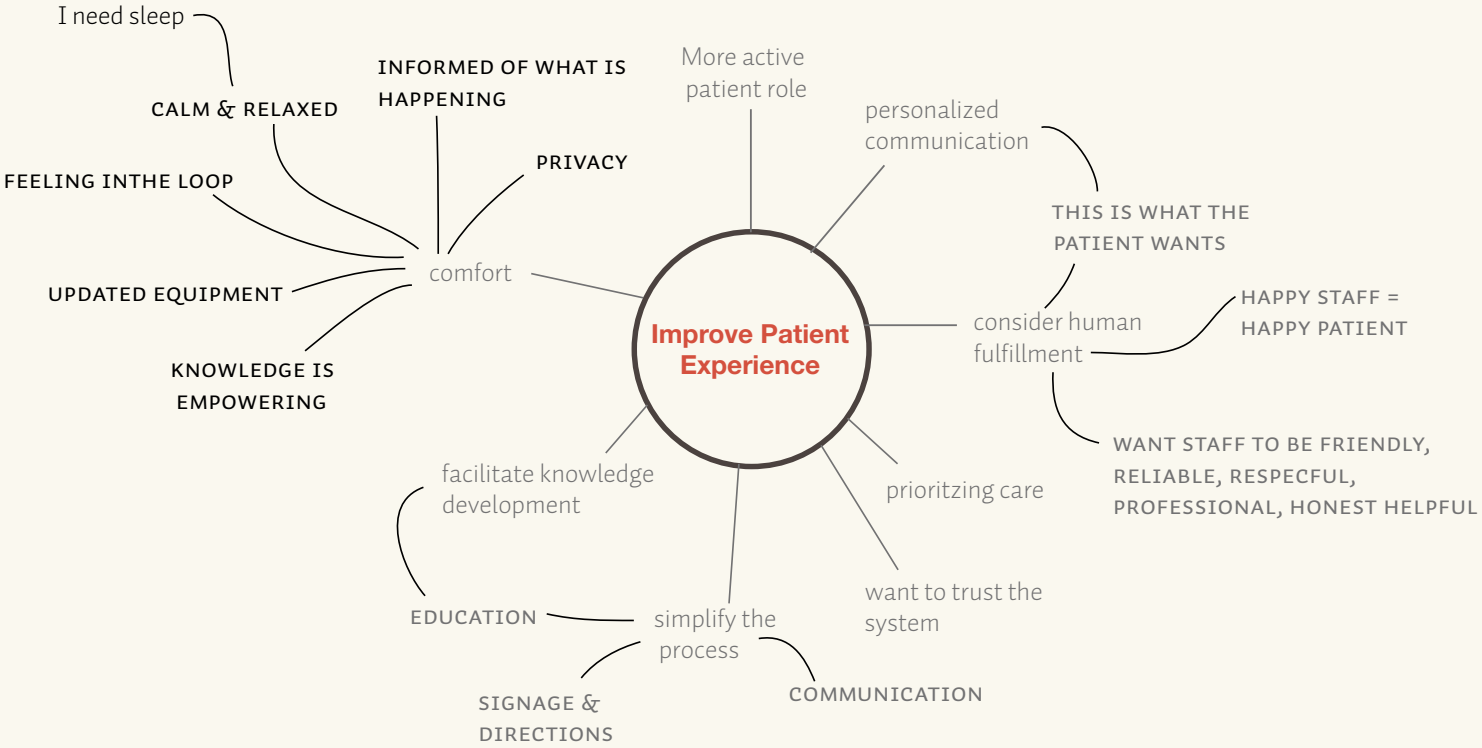
Weekly Text Updates

An opportunity to streamline communication, weekly update texts provide an extremely brief and to the point update. Enabling staff to reply to the message to confirm knowledge is another way to reinforce an idea or new concept.

Cognitive Mapping

A digital interpretation of two maps, illustrating idea space to design solutions.





Understanding Where Staff Fit Best

An interactive app intended to improve the general happiness of staff in their role; to allocate staff into areas that they find meaningful within their work. Three simple geometric shapes could illustrate personal understanding; a circle for positive areas of work, a triangle for constructive areas that are under development and a square possibly for interests. After naming the blocks and adjusting their size they could be placed on some form of chart to better understand where the staff member best fits within the hospital. The feedback from Fraser staff on this idea was that they felt this kind of activity might provide a better sense of connectivity between staff and allow management to redesign teams and draw out specialized strengths within individuals.

Large LED Projection of Social Media

An LED projection was presented as a manner in which public ideas can be captured and responded to effectively. It could be presented at the ED entrance and possibly within other waiting rooms around the hospital. The multi panel board begins with a welcome message that scrolls in different languages. Important safety policies could be posted within the welcome message. The second panel could support way finding within a hospital or between facilities by providing an interactive map. Finally there could be a live twitter feed broadcast allowing all waiting patients to benefit from some very current and possibly pertinent requests. Executive feedback on this board indicated that this kind of board would also be helpful in the patient room in order to personalize communications to better support the patient and enable their advocates. The Fraser group emphasized the importance of acknowledging any patient communication; they felt that by enabling understanding and communication that there was a possibility to better "humanize" the hospital and could possibly let patients get to know staff better. There were concerns raised within this idea of public shaming or cyber bullying. This kind of feedback cycle is also only going to target twitter users and needs to be inclusive of a much broader audience in order to be effective. There are also possibilities in gamifying health related games.

AMA

"Ask Me Anything" is a live communication board which deals with hot topics that might be useful to others. Common AMA's could make their way onto the FAQ page or possibly be integrated into the briefing message. The idea of using informal language in "Ask us anything!" was received well by the Fraser group as a better manner in which to develop care relationships with patients.

iBeacons

iBeacons provide an opportunity to provide location based notifications. You could receive alerts as you pass through a doorway that reads, "please wash your hands" or provide nurses with immediate up to date critical patient information as they walk by. At discharge the patient

Collective Brainstorming
Students joined with Fraser Health executives and staff to choose an appropriate direction

could be pushed an exit survey and upon their return home the app could push rehab activities or healthy diet options. Other options for these push notifications could include: Instructions for the use of a particular piece of equipment or tool, fall risk points around the hospital, outbreaks, wayfinding, visitation restrictions and directions to nearby environmental features. The executive team emphasized that this particular options would be nice if it was quiet and that enforcement of privacy concerns would be critical and that there is potential to use iBeacons and be non-patient specific.

Interactive Timeline

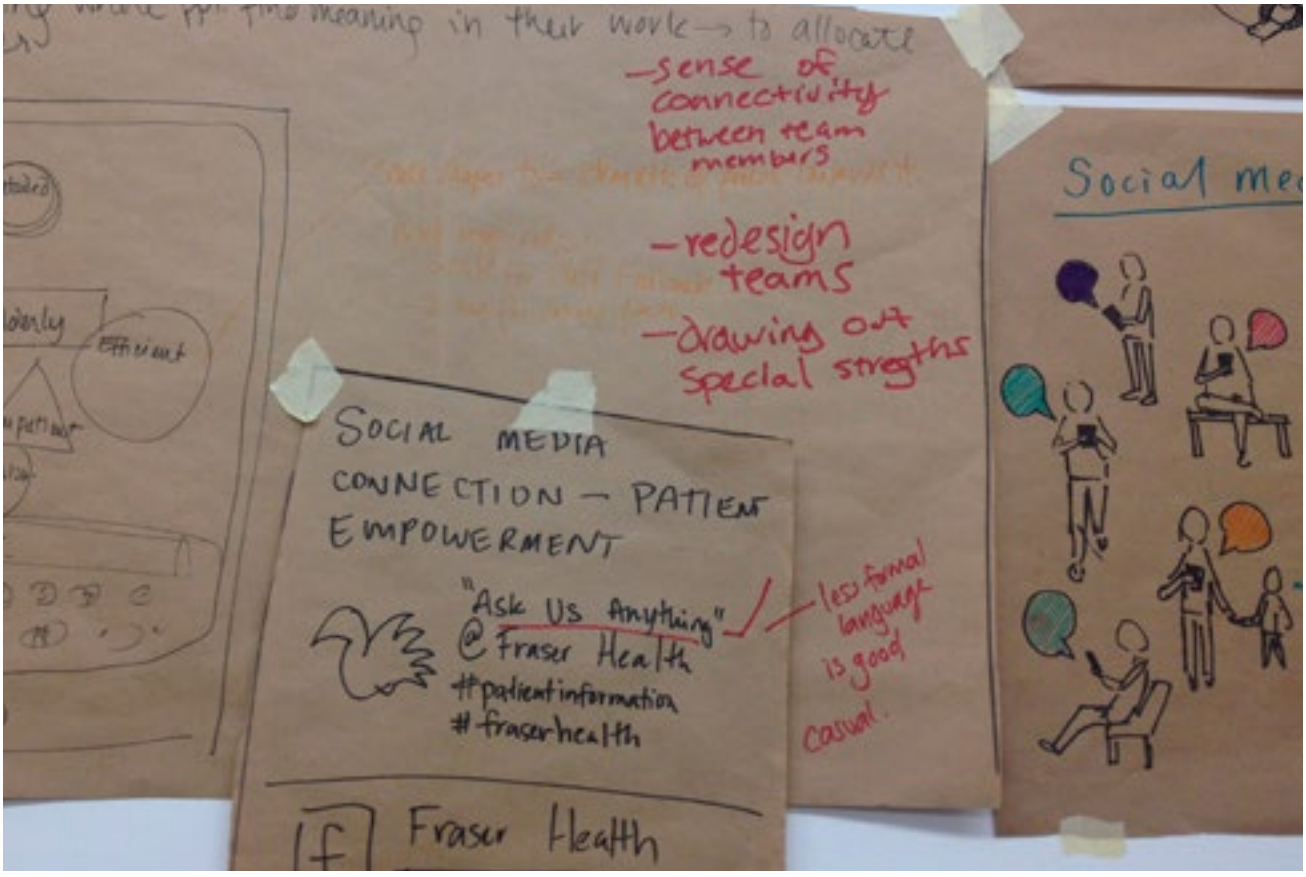
A timeline system already exists within the surgical area of the hospital in order to understand where a patient stands within their care cycle. The executive team seemed to think that because to some degree this form of communication is already used internally within the care team that leveraging it to support communications with patients would represent a simple but effective expansion of use. The focus should be upon what was described as the ADC or "Activities of Daily Care" which include but are not limited to diet, mobility and toileting. A pictorial emphasis as opposed to written will better enable those who have limited English skills. Privacy sensitivities can be avoided by speaking in generalities; for example, instead of listing the names of medications that have changed, simply engaging an icon or symbol that communicates that a change has occurred in location, medication, mobility etc. Within the timeline cause and effect can be demonstrated and appointments, exercises and social events could be integrated into the graphic.

RFIDs to Track Wait Time
Bracelets or tags handed out during admission would provide the patient with wait time information ranking them against other patients. As an alternate to RFID, QR and barcodes were suggested as an alternative. Concerns here are for privacy in indicating which patient has longer to wait and why in addition to union related concerns with the tracking of people. The use of RFID's is likely five years out in the future for Fraser Health.

Asset Tracking using RFIDs
Simply stickering equipment may give staff a better idea of availability and location. The idea would be to view the locations on a map within an app that tracks when an object leaves an area. This is ideal with beds, pumps, wheelchairs and stretchers.

Findings from the session were diverse, and helped to direct the focus of our design solution. We learnt that when indicators and routines for caregivers are present, patients become increasingly comfortable with staff members which can assist in leading to patients asking staff to wash their hands. This will ultimately lead to a reduction in infections. Opportunities that were explored through initial ideation included the possibility of producing print materials for patients, developing further iconography, increasing item and infection control accessibility, addressing hierarchical placement on patient charts, code words, whiteboard usage, visual cues and patient bracelets. Key concepts that were elaborated on due to their potential future involvement included print items, accessible items and whiteboard usage. Print items included the possibility of implementing a 'Get to Know You' booklet which would function as a communal chart between patients, doctors, nurses and allied health. Access to more items supported ideas around giving patients sanitizer closer to their bed locations and access to a centralized communication system such as a whiteboard. The development of a whiteboard could provide an opportunity to create an area where the patient, family, friends and healthcare providers could all communicate effectively. Each of the ideation outcomes were intended to facilitate patient comfort in order to provide a sense of encouragement and possible behaviour change surrounding the power dynamics between patients, families, friends and healthcare providers.


PATIENT STORY
CELEBRATING SUCCESS : ACKNOWLEDGING PROGRESS.
HELP US HELP YOU
CAMPAIGN
GAME
? an icebreaker.
TOOLS


meaning in their work → to allocate
-sense of connectivity between team members
-redesign teams
-drawing out special strengths
Social me
SOCIAL MEDIA
CONNECTION — PATIENT
EMPOWERMENT
"Ask Us Anything"
@Fraser Health
#patientinformation
#fraserhealth
less formal language is good
casual.
Fraser Health

3

Design Outcomes

concept development, design ideation, iteration & finalization

Introduction

From the previous research phase, students moved to ideation. At this stage, hundreds of possibilities were imagined and visualized. These were displayed intentionally loosely as sketches on Kraft paper, and displayed floor to ceiling on all the walls of a large studio. To solicit input and feedback from the partner, the Fraser Advisory Council was invited to attend a 2-hour critique. Each council member was given a marker and was paired with a student or group of students. Students were instructed to briefly review the work, then to facilitate a discussion of it with the goal of generating new ideas with their partnered council member.

This proved to be a valuable design tool. Not only did it provoke a rich discussion, students were able to quickly discover and understand the management team's needs and perspectives. Out of this critique came three areas of focus: patient empowerment; better use of white boards and smart boards as communication tools; and a patient centric iPad app that would put the patient at the centre of their care.

Circle of Trust

In order to communicate this sense of patient empowerment, we visualized a patient at the centre of an imagined "*circle of trust*". This concept is not necessarily unique to this program. Indeed, we later discovered that the Helen Hamlyn Research Centre had partnered on a project authored by Indri Tulusan entitled "Circles of Care" (2004) and a quick web search will turn up many results for "*circle of trust*". But we felt the phrase was still valid—it nicely expressed our focus.

Patients First!

The phrase "Patients First!" became our logo because it successfully represented the project initiatives. The sans-serif typeface, FF Meta is used to create our logo. "Patients" is set in bold and uppercase and "First!" is set in italics and lowercase. The mixture of the bold and italic weights stresses the focus of patient safety and care. The logo encompasses a playful composition of the words overlapping which also creates unity. The logo and phrase, Patients First! was also developed into a button design. The buttons were designed to act as motivation and support for patient safety and care. The bright colours and playful composition of the logo makes the user and his or her peers feel invited to participate.

Campaign Matierals

The Patients First! poster design developed from our analysis of our patient briefing video script. We incorporated valuable messages that focused on the initiative to shift healthcare culture by promoting patient safety and care as priorities. We began to brainstorm different phrases that would communicate the importance of patients. Some of the initial phrases we developed were "You're the focus of our care at Fraser

Through our compilations of analyzed notes from co-creation sessions, we separated the ideas into three categories: rituals, team and culture.

Health" and "You're the centre of our care team." Although, both phrases spoke of the focus on care, the emphasis on patients was unclear. After several revisions, we came up with "Patients First!" We chose to use this phrase because it concisely and boldly communicated the project initiatives.

During the development of the poster's visual language and composition we set an emphasis on building trust within the care team and to set the patient as the centre of the team. We added our *circle of trust* graphic to visually communicate the importance of patients in the healthcare system. This became the focal point of the poster. To further stress on centralizing patient safety and care, the design composition is centre-aligned.

This visualization shows the patient in the centre, surrounded by their caregivers: doctors, nurses, allied healthcare workers, and the patient's own support network of partner, family and friends. As visual metaphors can be such powerful communication tools, we decided to make this graphic a central part of the overall initiative.

We experimented with various colours in our master swatches and went from pale yellows and browns to bright reds and bold blues. The pale yellows and browns were too mellow and lacked the energy we needed to communicate, whereas, the bright reds and blues worked well to catch the viewer's attention.

Patient Empowerment

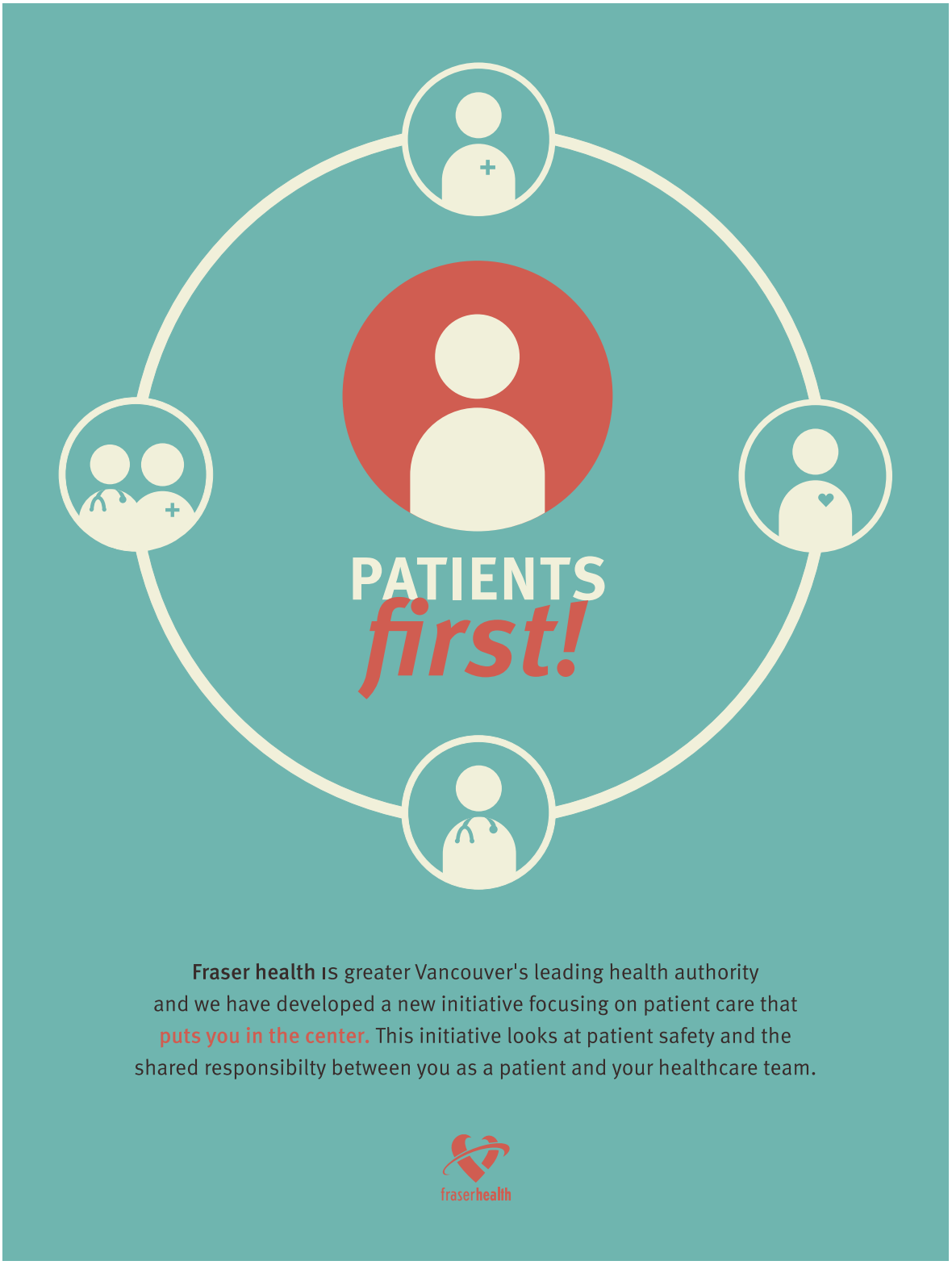
We felt the best way to begin educating patients on their care and the potential for their increased involvement in it, was to begin every hospital admittance with a patient briefing. Ideally, we are recommending that this not happen in a waiting room or at a desk, but at the patient's bedside. This ensures the patient is comfortable, relaxed and is hearing the briefing from one of the members of their "*circle of trust*" (a nurse). This emphasizes the shift in emphasis to both parties, and allows the patient to start understanding that they are at the centre of their own care.

Partnerships

Partnerships within any environment are essential in creating a culture of trust and care, certainly in developing lasting working relationships between co-workers, managers and the general public. To develop a safe environment in which patients and the healthcare team could work together in taking responsibility of the patient's health, partnerships need to be encouraged and worked towards as a goal. During the many co-creation sessions held, we found out that one of the core issues with patient awareness was the lack of support patients felt during their stay in the hospital. Patients, and even staff, often felt uncomfortable or uneasy in questioning what was happening, despite being aware of possible health and safety risks. To counter this alarming issue of power dynamics, we decided to work around the concept of flattening hierarchy by instead enabling positive partnerships.

Patients First!

The concept of placing the patient at the core of hospital interactions is a key component of our design outcomes



Patient Briefing Storyboard »
First page of the initial storyboard for the video, focusing on motion graphics.

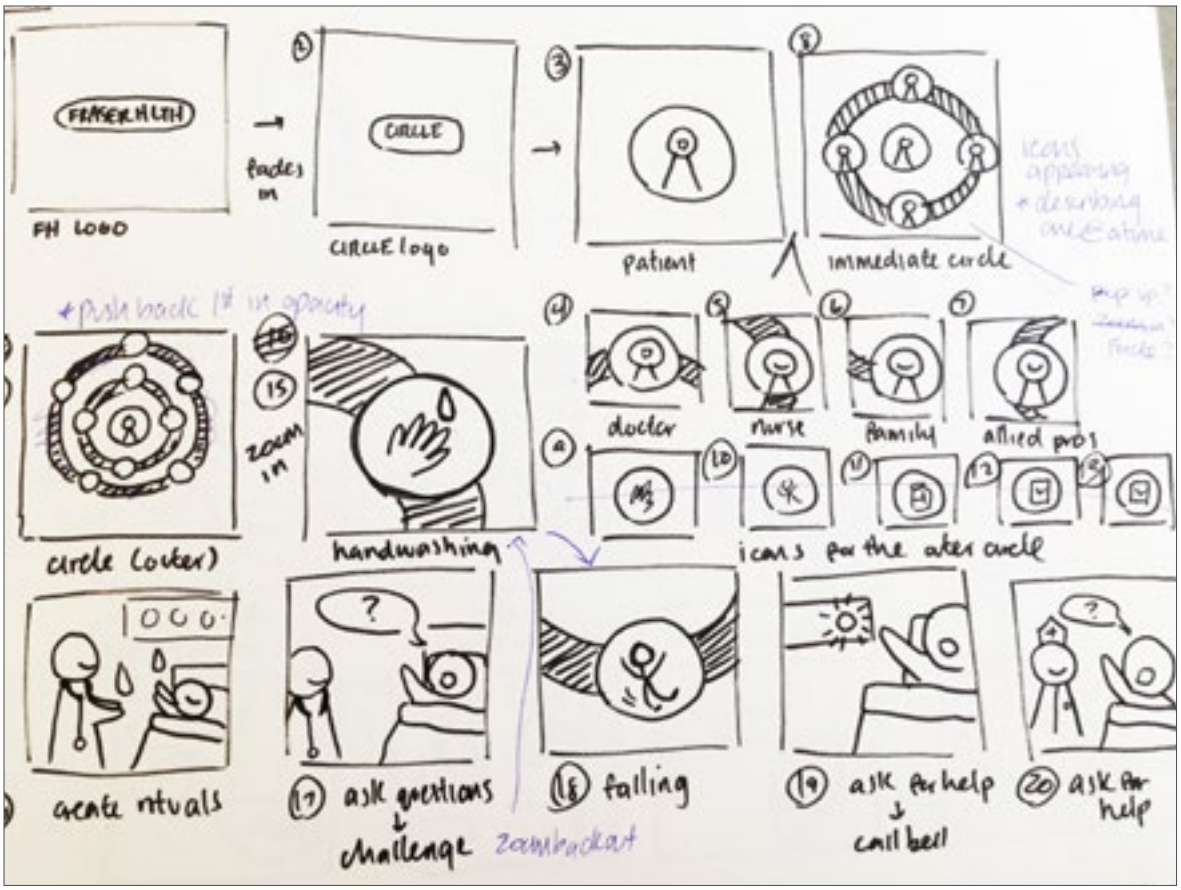
In order to address the concept of enabling partnerships, we had to delve deeper into the roots of the problem. Through our compilations of analyzed notes from co-creation sessions, we separated the ideas into three categories: ritual, team and culture. To create a culture of safety, we need to first build a team in which everyone trusts everyone else. To continue its implementation, rituals of safety had to become the norm. Brainstorming around each section, we came to the conclusion that in order to create this environment, integration of patients into the care team had to be the starting point. Knowing and understanding what is happening to them will allow patients to feel more at ease and perhaps, more comfortable in posing questions or raising concerns to their immediate healthcare team. Having knowledge will allow patients to feel more in control of their own health, thus, instigating a new culture in which we could potentially counter power dynamics within the hospital.

Ideation Phase

Three main categories were chosen from the conceptualization stage. Interrelated, those concepts were further explored and expanded to establish possible and tangible design outcomes.

Team Building - The first category was team building. As the basis of forming working partnerships, we explored the possibilities of enabling and creating a feeling of belonging to an existing team - a team in which the patient would be an active participant at the centre of what became the "Patient's First" initiative. In developing initiatives to support active team building, we considered the promotion of conversation and active listening, along with creating more possibilities and opportunities to connect (patients and families with healthcare workers). The design solutions formulated from this category, were brochures and booklets to introduce communication possibilities and what they could expand and grow into. Campaigns that would promote the importance and benefits of communication (with the implementation of visual cues) in building a 'whole' care team, would be another way to engage the patient in a more straightforward way, as well as trigger conversation during face to face interaction.

Shifting the Culture - The second category was culture in which we explored the idea of the creation and development of a new culture to be implemented throughout the hospital. Culture involves ways of behaving, values and ethics. Belonging to the same culture means living and behaving along the same lines, the same set of beliefs, values and codes of communication. The culture we proposed to develop was one of trust, where success would be celebrated and where there would be a feedback loop to show and understand the benefits of such change. Here, the communication outcomes considered were workshops, and educational materials.



Establishing Rituals - The third category was rituals. Rituals were identified as a very promising and powerful way to develop and implement a new culture. Because rituals are tangible and physically manifested, they support culture and are essentially a key support to build upon. Once rituals are implemented and become part of everyday life, participation can be more comfortable to people and become the new norm of interaction. This leads to a decrease in anxiety. Behaviours are consistent and known, thus if reliable ways to care and be taken care of become rituals, they can become part of the hospital policy. Campaigns and videos as education material were considered here to introduce the rituals to be adopted, along with the benefits of adoption.

One example of the use of ritual to shift a culture is in handwashing. Patients may not feel comfortable challenging healthcare providers as to whether they washed their hands since their previous patient. While one could strive to introduce this as an initiative (eg through the use of buttons, or other promotions) we felt that a more collaborative, enabling approach would be to try to create an embedded ritual of mutual handwashing, where with every new patient interaction, every healthcare worker would wash their hands, together with the patient. This seemingly simple change would have 3 important results: first the healthcare workers would wash their hands, second, the patients would see it being done, and third, show that the patients that they themselves need to take some responsibility for infection control.

After considering print campaigns, brochures and videos, we decided to use video because it has

Ritual Practice
Still frame of a nurse and patient washing their hands together, practicing one of the encouraged rituals.

the advantage of being clear and concise. A video allows us to cover a full story in "one sitting". This format was also the best way to tie the education material to the app being developed. A narrative was created introducing rituals and expected behaviours through different chapters, showcasing infection control, falls, medication errors, discharge and patient resources.

Design Outcomes

In relation to the original concept and ideation, we developed a short patient briefing video that is intended to encourage positive partnerships between the care team and patient. The video functions as an educational tool to promote patient engagement, involvement and responsibility through the animated graphics and live content. The time during patient briefing can provide the opportunity to establish a positive interaction between the patient and care team. We focused on introducing the following key points surrounding patient safety: introducing the care team, infection control, medication error, falls, ensuring patient comfort, and discharge. As well, we wanted to introduce the usage of the app and whiteboard. Further, the content within the video, informs the patient of the various safety protocols to be aware of in order to promote a sense of empowerment and responsibility, before the start of care.

The video begins by introducing the mandates of the Fraser Health Authority. Each of the points then briefly touches on the primary safety

The patient briefing video offers a presentation of hospital rituals and expected patient behaviour by offering a concise and standardized brief.

issues affecting patients within Fraser Health and describes possible options for the patient to individually follow to maintain a safe hospital environment.

Functionally, the video is intended to be a form of communication between the care team and patient during briefing. Integrated into the app, the visual language is consistent as well as the whiteboard it showcases. The motion graphic shows the different actors of the healthcare team gravitating around the patient. The different chapters of the video are also represented as essential key points surrounding the patient. This graphic ties fully with the other elements of the initiative (app and whiteboard), while offering a simple overview of the patients environment.

Each point is described through scenes featuring doctor, family, nurse and patient–each performing the different safety rituals at the patient's bedside. The reason behind integrating live scenes for the description of each key point, is so people can easily understand the material and provide self-projection, as it is a "real" representation of what the patient's situation could be. The voice over consists of a single voice, allowing a very consistent narrative–easier to follow than multiple dialogues.

This patient briefing video is sourced in the ideation phase described earlier. It offers a presentation of hospital rituals and expected patient behaviour by offering a concise and standardized brief. The patient sees him/herself at the centre of the care team and care initiative, while being explained on how to be involved in his/her care: what is expected and possibly, introducing the multiple resources available for being an involved patient in his/her care.

Communication Boards

Communication boards are essential tools within the healthcare sector that provide patients, their immediate family and friends, and the general public with critical information that would be useful in addressing questions or concerns that may arise. During our feedback session with Fraser Health, we were recommended to utilize existing communication boards, specifically whiteboards, to enable immediate patient involvement. With this in mind, we aimed to redesign existing whiteboards and design a networked monitor system that would shift the culture and encourage patient empowerment, which would lead to involvement. This solution would provide caregivers and patients with vital and quick information that may be helpful in stimulating conversation and enhancing patient/staff relationships.

Public and Private Whiteboards

In our research, we discovered that whiteboards are mostly managed by healthcare providers and are divided between public and private whiteboards for privacy purposes. Public whiteboards currently exist within the hallways of Fraser

Health and various hospital settings that provide information about patient scheduling, fall prevention, infection control and various topics that patients and the general public may raise questions or concerns about. These are not restricted and are available and accessible to everyone. Patient whiteboards, however, are typically viewed by the patient and their immediate friends and/or family. Mounted in patient rooms, these boards contain some personal and health-related information involving the patient, medications, caregiver contact information and mostly, patient schedules.

Existing Whiteboards

During our site visit to Fraser Health, we examined some of the existing whiteboards and discovered a wide variety of uses. Some of the whiteboards, which are both vertical and horizontal, contain information about mobility, toileting, daily plans/goals, meals, and discharge plans. Healthcare providers were the only people permitted to write on the whiteboards. The whiteboards in the patient rooms were placed directly above the patient's bed and are made of acrylic and galvanized steel. There were also pin boards that were placed above some of the patient beds for further information for patients and their families. The public whiteboards existing in the hallways were horizontal and contained information for healthcare providers to access patient schedules and other information.

We found during our site visit and research that there is little to no patient involvement in the whiteboard use except for patient briefing and meetings with doctors and nurses during their meetings. Also, patients aren't able to participate in using the whiteboards due to the placement in private rooms above the patient's bed. We also examined the layout of the whiteboards and observed a constant need for caregivers to write the categories in with a marker before filling out information for the patient. As a result, this raised questions about the sanitation and maintenance of the whiteboards.

Ideation Phase

In our ideation phase, we brainstormed existing and potential layout content and also a wide range of layouts for the whiteboards, initially focusing on the *circle of trust* between patients and staff to suggest a caring, trusted environment. After researching potential sizes and layout content for whiteboards, we concluded that having an 18x24 sized whiteboard would be ideal for displaying the vital information needed for patient and staff. We suggest that the whiteboard should include the patient's name, language, the care team, mobility, the plan of the day, and message, which would allow for caregiver notes and the patient's thoughts and emotions. Focusing on the issue of caregiver time, and to facilitate consistent use, we ideated around laser cut out templates and whiteboard materials that would be affordable and easy to maintain infection control standards and designed 3D prototypes

Whiteboard Ideation
Initial ideation sketches for the development of the patient whiteboard

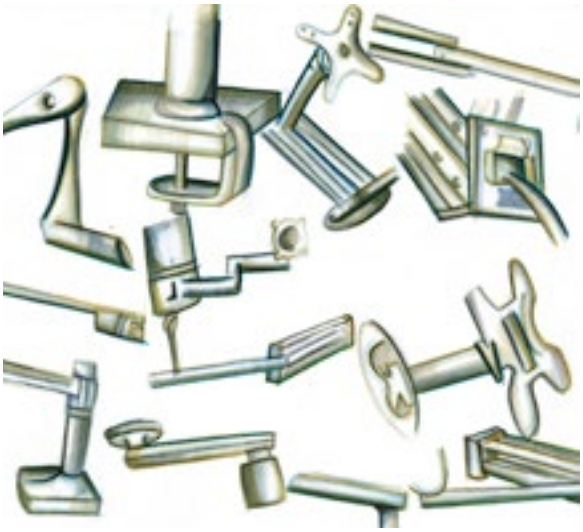
to show its workability. We began brainstorming ideas in regards to how the whiteboard can be used to shift the culture of staff managing existing whiteboards and encouraging patient involvement.

We are suggesting the use of circular magnets that would act as prompting tools for conversation between the patient and the members in their *circle of trust*. The patient would be able to voice concerns or emotions they may have initially been afraid of sharing with the caregivers during patient briefings. The magnets would also assist in breaking down language barriers. From our research on patient concerns, we developed a list of needs that could be represented by icons. We narrowed down the list to five main concerns which included conversation, information, and three emotions (happy, content, and distressed).

We further refined our magnet icons, making them clear and not so ambiguous. We test printed the magnets to ensure that the size and colours were to expectation.

Next, we researched and experimented with different stencil typefaces that could be traceable and readable on the acrylic laser cut out template and communicate patient safety. We printed different sizes of the selected stencil typefaces to see which would work best for the template. From this process, we chose a condensed, all caps and sans-serif typeface as it was highly legible. The typeface's rounded features gave a friendly and approachable feel to the whiteboards. After much exploration with the layout of the whiteboard, we sent the template file to be cut on an acrylic board at Emily Carr University of Art and Design's laser cutting lab.

Armatures
Conceptual sketches for an iPad armature.



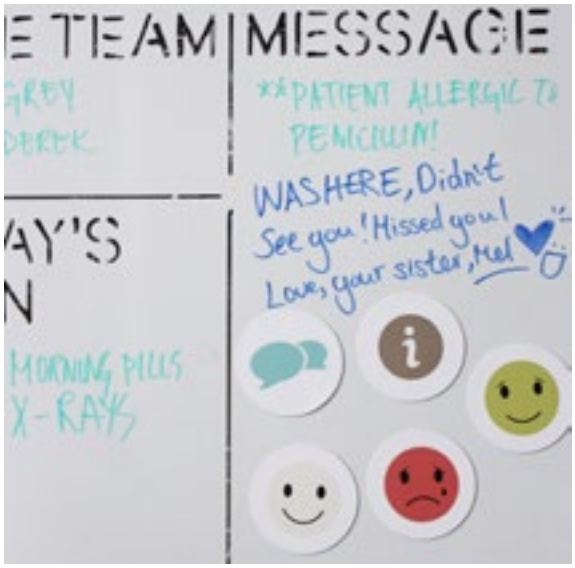
We ideated and researched existing solutions to whiteboard placement in the patient room to support our users' capabilities. Taking our user group into consideration, we identified the need to create a design accessible to patients with physical challenges. We researched armatures that held existing products such as x-ray scanners, computers, and tablets and also how the movement for those products helped create better accessibility for patients. We also researched adjustments of the placement of the whiteboard to accommodate the patient's physical abilities.

Design Outcomes

Considerations of the placement of the whiteboards included it being placed under a sliding table that would be attached to patient beds and wall placements using armature devices. We concluded that the wall placement using an armature would be an ideal solution. The wall placement of the armature would enable it to be safely tucked away in the case of emergencies and provide easy accessibility. We also considered the need for the material to be affordable and easy for infection control. We developed a handle design to facilitate users who may have difficulties with manoeuvring the weight of the whiteboard. The handle would also allow the whiteboard to rotate freely so that multiple users could view the information simultaneously. The handle would be designed to attach to the bottom of the whiteboard. In addition to this, we created 3D Solid Works and technical diagrams to show how it's built and its workability as well as storyboards for the whiteboard and 3D armature for present, immediate future and long term future use. We made these storyboards using 3D drawings of how they would appear in the hospital room, interaction between the patient and staff, and patient interaction with the whiteboard.

In conclusion, we considered the issue of patient and staff involvement and patient safety through whiteboards that the patient would use to communicate emotions and concerns while still being able to access other important information. We aimed at making this a quick and easy process for the patient by using an armature which the

Patient Whiteboard
The final patient whiteboard complete with laser-cut template for ease of use.



whiteboard would be attached to. We considered the issue of staff time consumption by creating laser cut out templates that would be consistent for current and future use. We designed magnets that would be useful for patients who don't feel comfortable with verbally sharing their thoughts and concerns with nurses and doctors. The whiteboard is useful in not only encouraging patient involvement and keeping them aware of important information related to their stay, but also enhancing patient/staff relationships and creating a *circle of trust*.

Next Steps

Smart boards are interactive whiteboards that use touch detection for user input and could be used in hospitals to track patients using technologies such as Radio-frequency identification (RFID) and bring patient information from the EMR to networked monitors in the patient's room. Upon research, we discovered that the GetWellNetwork developed a similar smart board system concept to ours. GetWellNetwork created interactive patient whiteboards to improve patient satisfaction and quality of care by helping patients, families and caregivers easily share meaningful and up-to-date information on the most pressing patient concerns. The networked monitor design was organized into three patient-centred categories, which are 'My Team', 'My Day' and 'About Me' to address three of the most pressing questions by patients in the hospital and are managed by clinician whiteboard managers which enables them to update patient itineraries, add items to the care plan and address patient logged questions. This design relied on keyboard and remote control, which we considered a flaw to the design. The slits within the buttons of the controls would be challenging to clean and sanitized and thus, become breeding grounds for bacteria.

Brainstorming on possible ideas around patient safety within Fraser Health, some ideas we explored were to have patient or hospital related information that would be collected by the specified public or patient smart board to display for the hospital community or patient. During

Patients First! Network System

Screenshots showing the design progression of the Patient Network System from its initial stages to final outcome

Version 1

Version 2

Version 3 (final outcome)

this process, we thought in detail of the user experience and available technology. We also had to design while considering infection control. We thought about the types of public information that could be included in the public smart boards and patient information for patient networked monitors. In terms of the public smart board, we recollected the project goals and selected subjects we felt appropriate. These included subjects such as patient education, news and updates, and way finding to and within a hospital in the form of maps. Information that would also be filtered in the public smart boards would be up-votes as recognition and motivation for caregivers, achieved goals by patient as recognition and motivation for other patients or caregivers, and waiting times for patients and their friends and/or family.

In terms of patient networked monitors, each ward would have its own networked monitor system containing its patient and general information. Each patient would have their own networked monitor that collects public level information such as messaging between caregiver and patient, Fraser Health-related news and updates, and today's plan from their Patients First iPad application. The patient would navigate the networked monitor by using the control in the application. The central control of a ward's smart board system would be maintained by the unit supervisor. The central control would be a computer-based system with drag and drop widget technology that would aid in the organization of information, making it easily accessible for staff. It would be used to send and divide information into public or designated patient networked monitors and receive feedback from patients. It would consist of two monitors, one for selecting content and the other to preview content. The system would be beneficial for the hospital community as it would be maintained and updated regularly.

The public smart boards would assist in way finding and provide Fraser Health-related news and updates, patient education, and waiting times. Because the public smart boards would be touch-screen interaction, infection control would be easily maintained. The user would be prompted to sanitize his or her hands before and after use. Both public and patient screens could be easily and consistently cleaned with anti-bacterial substances such as anti-bacterial spray and wipes. The networked monitor system would assist in organizing information, infection control, and in obtaining feedback from users such as patients, their immediate friends and/or family, and caregivers.

Patients First! App Design

Our ideation process began by revisiting the ten principles developed in the primary research phase. From those ten principles we brainstormed a myriad of design solutions that would

potentially improve patient safety in hospitals.

Our meeting with Fraser Health directed us into three areas of design, one of which was a bedside iPad app. This app would connect patients, staff and family, and would provide current patient education to create a sense of empowerment and agency to ensure ones own safety in the hospital.

App Goals

Building Partnerships - We wanted to accomplish this by including a sharing function, where family/friends of the patient can see exactly what is going on with their loved one's care from a home computer or mobile device. The family/friend would receive notifications in regards to changes in patient care.

We would further build partnerships by creating a feedback loop between Fraser Health, hospital patients and their families. The app would allow patients and family to rate their experience in the hospital. This feedback would be visible to both hospital administration staff and other patients, enabling conversation around common areas of discomfort. Our choice to include a feature by which patients could "up-vote" staff if they had a particularly exceptional experience was driven by the priniciple 'Celebrate Success'.

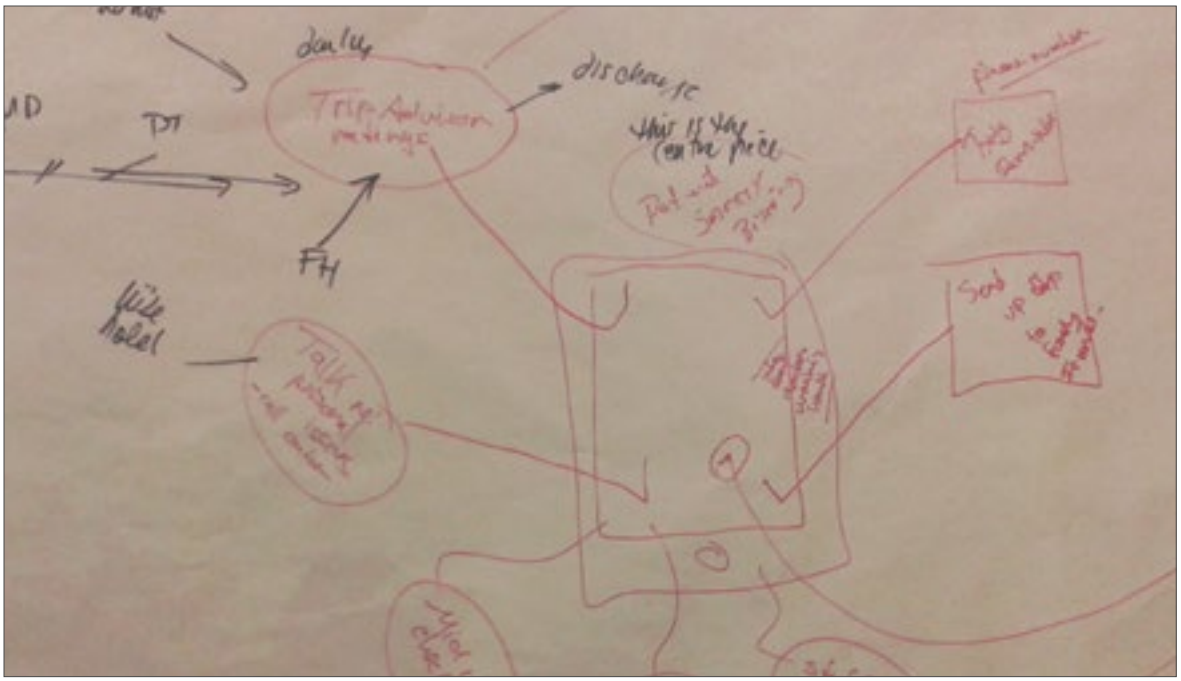
Patient Education - We see education as the first step towards empowerment; patients with a coherant understanding of their health condition and care plan would be great assets in updating caregivers on their condition. To assist in this building of knowledge around patient safety, our team proposed several media possiblities, such as a safety briefing video, similar to an airline safety video, or an interactive game that would also serve as the account set up for the app. However, a video allows for a higher level of patient engagement, and so was chosen over the interactive game concept. The video would address the main safety issues in the hospital, such as infection control, fall prevention and medication errors.

An additional element in the realm of patient education would be an Electronic Medical Record, allowing the patient to see prescription information, procedure schedule and medical history. Ideally, chart information would be translated into plain language for the patient to ensure complete comprehension.

Positive Patient Experience - We wanted to create an app that would improve the patient and advocate hospital experience by catering to their physical needs, this would be done by informing them of hospital amenities and activities. In addition, a 'Meet your Physician' feature where a patient would be able to learn more about their caregiver would help to build a connection and relationship between caregiver and patient.

Our app sees the importance of promoting hospital events and news to both the patient and family members to encourage the building of community within a facility.

App Design
A mind map by Dr. Nigel Murray, created during the Collective Brainstorm session with Fraser Health and Emily Carr



The app includes a timeline where the patient can record their personal and medical events and set goals and milestone events. Users would be able to rate their mood and leave notes, providing patients with a central point to track their care experience. In addition, a patient journal segment of the app would serve as a space for a patient to note down questions or concerns for their caregiver.

After getting all our ideas for features on to paper, we moved to the conceptualization phase where we began to give form to our ideas, and make it into a real app.

Precedents

We looked at existing apps and websites to understand design patterns and the context we would be designing in. These precedents were Hello Doctor, Get Well Network, FitBit, Mood Panda, Outlook, Trip Advisor and Reddit.

Hello Doctor - Hello Doctor is an app that empowers patients to take control of their healthcare records. By processing the language, Hello Doctor can spot acronyms like RBC (red blood cell count), allowing it to recognize the RBC value of 8.1 on a record. What does an RBC of 8.1 mean? This is exactly what Hello Doctor uses a pop-up box to explain, giving context to the test and visualizing the result on the chart's full scale. The application attempts to make some of the more specific information associated with medical records more manageable. The idea of contextualizing healthcare data within an app is a potentially difficult task. Such data would need to be accurate or there could be significant consequences. Because of this, Designer and co-founder Ziv Meltzer, described Hello Doctor


HOW TO USE THIS AP
INTERACTIVE MAP
[BRIEFING]
VIDEO
INTERACTIVE GAME/THING
LOCATION INSIDE HOSPITAL (WHERE TO GO)
FAMILY ACCESS
@ home
DO NOT


MAP
BRIEFING (NURSE)
FAMILY
PATIENT
PT
PT
CARE TIMELINE + PERSONAL CARE TIMELINE
RECORDS
DOCTOR
OCR
AMA
(SHARE)
CARE CHANGE NOTIFICATION

« Brainstorming
We refined our large scale ideas into cohesive features that would work together in an app

as “the first project that frightens him”. It has enormous potential to improve the healthcare experience if done correctly.

Trip Advisor - Trip advisor served as a precedent as it creates a feedback loop between customers and the establishments they visit. Trip advisor allows users to see reviews and gather information from people like them on the ground before they visit a place.

We aimed to do this to a certain extent with Patients First, where patients and visitors could provide feedback to improve the hospital experience for themselves and for others.

Personal Fitness Monitors - Personal fitness monitors such as Nike Plus, Fuel Band, Jawbone Up and Basis Science are great examples of how data can be used to drive positive change. So far, this data has been used for consumers to promote increased activity levels and more consistent sleep patterns. The goals set through the application seek to motivate personal activity through the improvement of actual data entered into the systems. Reflection upon the data can assist the user in identifying new solutions to personal activity. Basis Science has a prominent focus on goals and badges and does a great job of gamifying the experience.

These devices shed light on how providing a patient side goal system is a great way to drive patient participation, compliance and interest in their treatment.

In the same way, a bigger picture of overall patient data could be aggregated in a way to motivate the provider to increase their overall level of care.

The Jawbone Up in particular collects a significant volume of data about your fitness, and presents it in a clear way to help draw conclusions and change habits. Up software uses a timeline as a foundation for logging the multiple streams of data provided by both the sensor and the user. The use of colour in the timeline and the other references in the software allows a variety different tasks to stay perceptible despite many streams of information. This is especially useful when reviewing multiple days at a time.

Mood Panda - Mood Panda is a mood-tracking app, which is useful for people with anxiety and depression. This translates well into a patient’s hospital stay, because they can let their family/friends and care providers know how they are feeling and comment on it. Their discomfort may be due to medication, bed discomfort, anxiety in the hospital. By tracking a patient’s mood, it provides a way for care providers to see how their patients are doing in a way they might not have had access to otherwise.

Reddit - Reddit is a massive online community discussion board, where users post content, and other users comment on it. Interesting posts get up voted or down voted, dictating the order in which content is presented.

Our goal was to make an interface so clear and simple that users of all technological skil levels would feel comfortable using it.

We looked at adopting only the up voting feature from Reddit for hospital staff members so those that made a patient's experience exceptional could be celebrated for their good work.

Outlook - Our team looked to existing standard precedents for the Calendar functionality within the App. Outlook, being the standard for time management provided several ideas as to how to organize and illustrate a day's organization. We borrowed the idea of booking and accepting invitations to appointments using shading or opacity to indicate whether an appointment was accepted or pending. Similarly, the use of visual blocking within a day view to build a structure of appointments lends itself to an easy understanding of upcoming meetings and potential conflicts. Finally the ability to book and see into other calendars was an idea generated by Outlook which permits users to understand when time is available enabling friends, family and medical practitioners alike to work together with minimal effort.

Get Well Network - The Get Well Network interactive whiteboard is a collaborative bedside communication tool which brings nurses, patients, families and doctors together. It is a large monitor that sits on the wall opposite the patient's bed, with the patient controlling it through a keyboard and remote. The patient is able to ask questions, leave comments, set goals and see their daily schedule.

We were inspired by this technology because it demonstrates that a bedside communication system is possible and can be very effective.

First User Flow

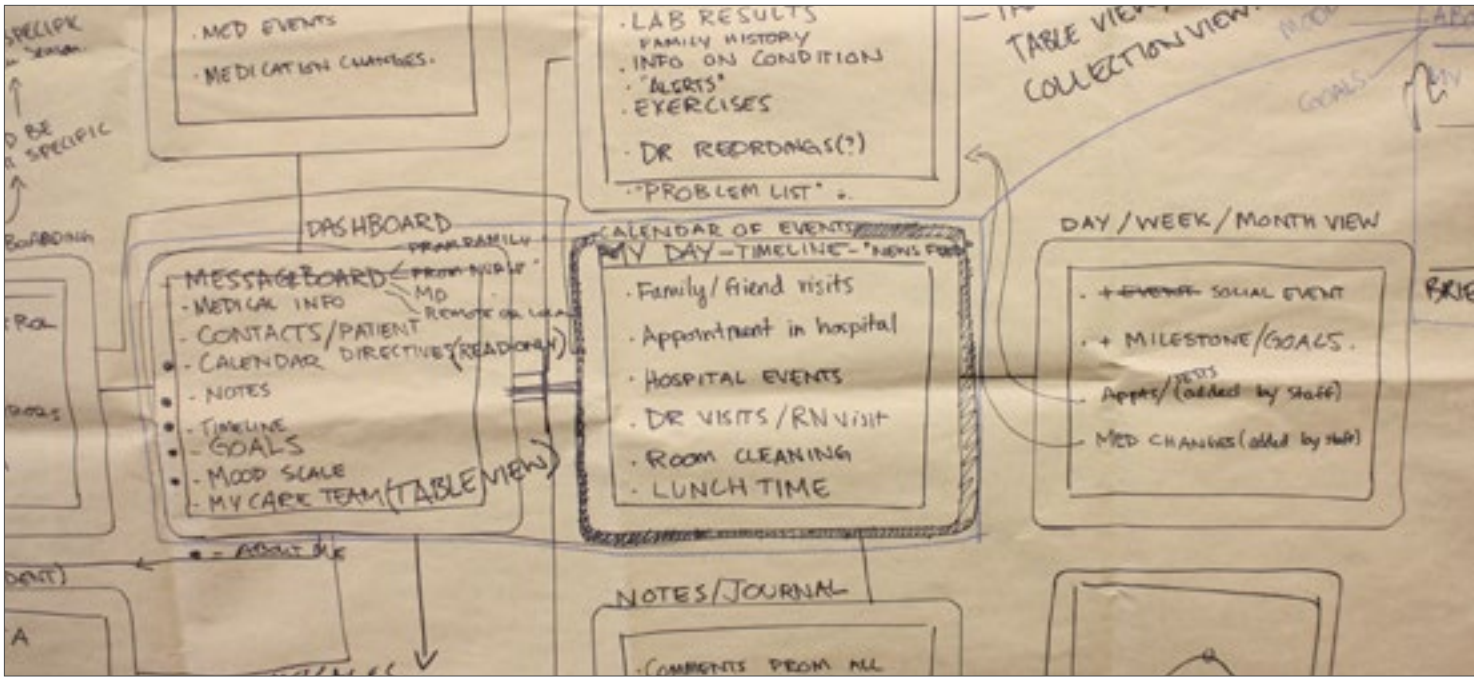
Before we started putting all the potential features into an interface, we created user scenarios to understand how the patient would engage with the app. We imagined the user sitting in bed after being admitted, and a nurse giving them an iPad. Through this scenario, we were able put the myriad of features we wanted to include in this app into a cohesive order.

In order to negotiate the digital space and sharing capabilities of the app, we needed to map out who would be able to see what part of the app, and from where data inside the app would be pulled.

We then took all our desired features and sketched out a cohesive user flow. Using brown paper, we walked through the app and tried to create a user flow including all the features we brainstormed. In this first user flow, we realized much of the app was falling under a "My Day" category.

We also realized we needed to cut down the app to create a more concise and easy to use experience. We created a more refined, digital version of our userflow, which included levels of sharing, but ran into a lot of permission questions, such as

User flow Ideation
A user flow walkthrough, which we used to refine our ideas for what would go into the app and how everything would fit together.



how much data could the app show, who could see it, where is it coming from and how is it getting into the app.

To resolve this, we split the userflow up into different sharing levels where patients were in the center, hospital was above, and external views were on top, and were able to categorize what parts of the app would be visible to each person. By creating a clear userflow map, we able to begin creating an interface for the app.

Digital Sketches

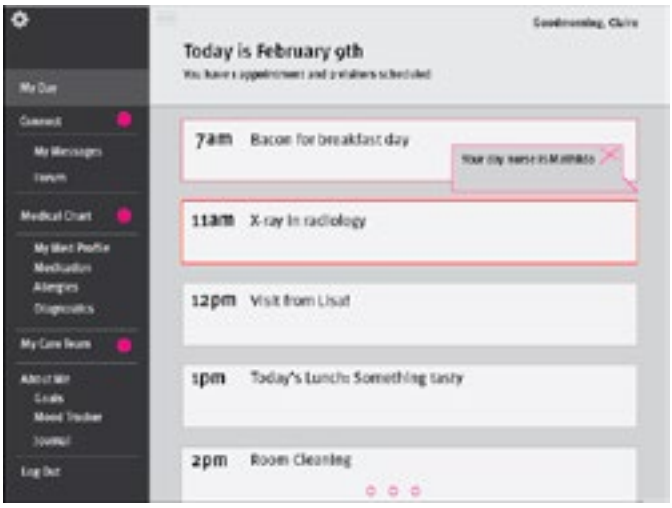
We began with rough sketches on paper, then quickly moved into digital sketching. In this phase, we visualized possible interfaces and how the user would engage with it.

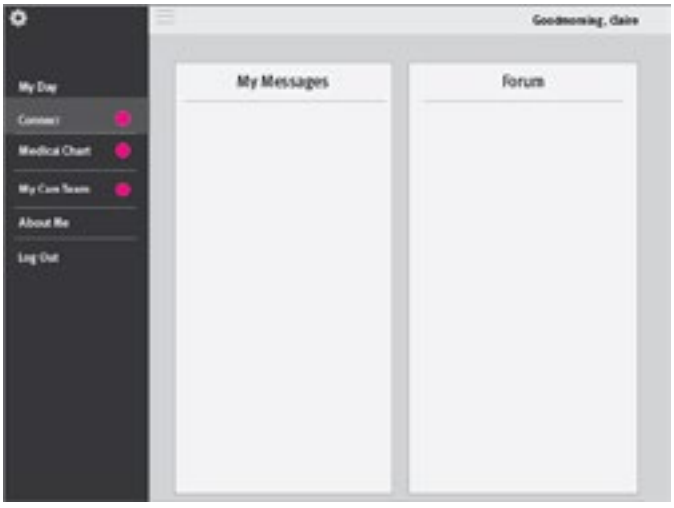
Our goal was to make an interface so clear and simple that users of all technological skill levels would feel comfortable using it. We decided to keep all of the navigation items in one spot. We also played with the idea of creating a dashboard or home screen that would give the user a summary of functions within the app.

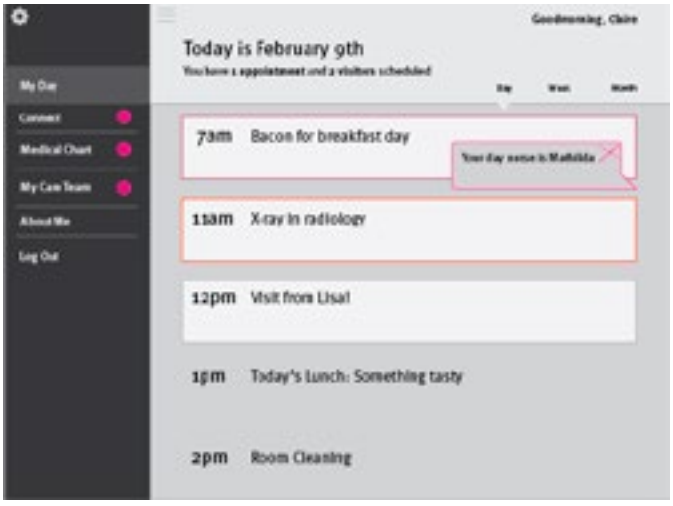
We played with creating a friendly, inviting welcome to the app by creating a greeting, and letting the user know what they had coming up that day. We also worked with the layout of each feature to see how we were going to organize this mammoth amount of information into its simplest form.

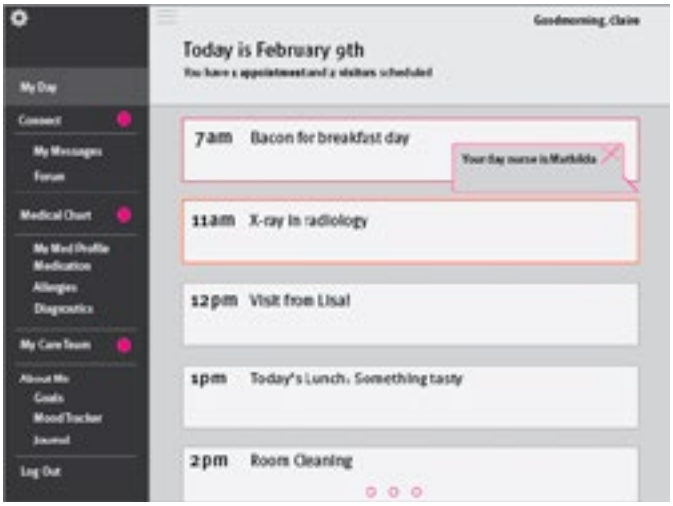
Digital Sketching

We aimed to put all the navigation elements in one place and create a welcoming home screen.









First Mockup

Initial ideas generated in the preliminary phase of the app development informed a series of concepts. These iterative concept developments ultimately lead to a patient centered system that empowers the patient by enabling communication and information transparency.

The first mockup sought to build a stronger relationship of trust between the care providers and patients by making medical information transparent and accessible. This design centered around a fairly robust EMR which carried the patient through their care plan while providing supporting information such as their prescribed medication, care team, diagnosis and historical health records. This 'Chart' menu within the application would not only allow the patient to feel empowered to take charge of their own care but would also enable advocacy through information availability to friends and loved ones. These advocates would be loaded onto the App by the patient.

Original menu items were as follows:

• *Connect*: a center for communication and a hub for Care Team information

• *Calendar*: a scheduler for appointments, visits, and hospital events

• *Information*: providing information on hospital policy, infection control standards, medical error prevention tips, fall prevention and maps for hospital navigation

• *Chart*: a future EMR hub for the patient to access their medical data

• *Account*: wherein the patient would manage those who have access to their app in addition to personal account management

Dashboard

The patient is initially welcomed into the app with a dashboard summarizing the contents of their care. The timeline introduces the patient to their stay. By integrating the patient into the care team, a sense of advocacy, trust and transparency is created. The timeline has scheduled hospital appointments and personal markers flagged as entries from the top and bottom. The idea of a timeline came to the surface in discussion in the Collective Brainstorm session at Emily Carr and stems from an existing system within the Surgical department which already uses a timeline to manage patient care.

In order to build empathy and compassion into the timeline, the design enables a mood input which might help the patient understand and communicate their current emotional needs to the care team and family. It also charts improvements as health goals. Downward trends within mood might highlight feelings associated with particular appointments or medications, which would further enable the Care Team and family to support the patient.

The notes function further enables personal expression and communication within the timeline. The patient is able to journal or share personal insights with those in their care team and family. This offers a central hub for both advocates and medical practitioners to understand a 'day in the life' of a patient while offering a secure outlet for the patient to freely express themselves while in the hospital.

Appointments within the hospital are marked on the timeline, providing another opportunity for the patient, friends and family to leave notes in order to trigger conversation within an appointment. This enables advocacy from afar and could trigger the patient to consider and document their questions or concerns in advance of the appointment. This option was provided as a result of design research, which indicated that some patients did not always feel mentally or physically able to advocate for themselves when friends or family were unavailable to be available to attend an appointment.

The goals marker orients the patient towards taking a more empowered role in their healing. Viewing approaching goals in the header of their dashboard was intended to keep the patient focused on incremental progress and also offers possibilities in celebrating their successes in healing. Similarly, this also allows the care team to help a patient plan out their gradual improvement and enables the family to support their success. In correspondence with the timeline the dashboard forecasts a discharge date; the design team hoped this would keep the patient motivated to remain engaged with achieving goals and maintaining focus on healing.

Within the dashboard there is also quick access to the 'connect' or chat function, news items populated by the Fraser Health twitter feed and links to infection control information in addition to an alert describing medication changes. These hot links allow the patient to see a high level of their life within the hospital system while staying abreast of the hospitals expectations regarding the protocols of living in or visiting the hospital.

The calendar acts as a place for the patient to see and review upcoming appointments while offering the opportunity to connect with friends and family. The patient can receive visit requests and request appointments from those outside of the hospital. We felt that by making the patient feel more connected to their life as it exists outside of the hospital that they might feel more supported and less lonely. The banner at the top of the calendar provides a summary of the patient's day. Day, month and week views were made available for those staying for a duration.

My Chart in its first iteration focused on patient inputs, providing the patient with an opportunity to express and document their personal history. The exception with this is the medication tab which we hoped could be auto populated with information direct from the Pharmacy system.

The medication tab within My Chart, is a read only screen which we felt could link to an online resource through the 'i' icon which would provide the exact image of the pill and simplified language around the purpose of the pill, it's interaction with other medication and how the medication should be consumed. The plus sign would allow the patient to include other medication or vitamins previously taken or were currently taking. We felt that by providing this information the care team might be able to have a view into pharmaceuticals that worked for the patient and also see possible interactions with hospital prescribed medication.

The allergies tab would be entered by the patient and would provide the care team with background context into sensitivities. These could also be entered with the help of family in order to provide reference for the medical staff that advocates were unavailable and the patient was unable to effectively communicate.

Similarly the history tab could be populated by the patient with unrelated conditions to their current stay within the hospital but may become relevant. This field was added as a result of feedback from design research that indicated that some patients with a significant medical history with their family doctor wanted an opportunity to make this information available to the care team. Having high-level historical information to contextualize the patients concerns or behavior might further enable trust and empathy between the staff and patients.

Communication with staff and advocates in the first version of the app was managed through the connect menu. Within the connect menu, the mode of communication is organized based on it's audience – be it private or public. The message board was a secure mode of communication to chat with friends; family and the hospital care team. The manner in which a patient is able to connect with their support network within and outside of the hospital was visualized as a circle of support or 'trust' surrounding the patient.

Under the personal messages section of the connect menu the patient is able to have secure messaging with those in their care team, which, as mentioned earlier is inclusive of friends and family. After adding friends via the account table the patient could select members from the circle in order to engage in a chat or receive notification of a message. Messages would appear chronologically by date much like the messages within an email inbox. Given the absence of organization by sender; a search field was added in order to allow the user to find specific messages.

Under the "Public Discussion" section of the Connect menu the patient has access to the health community that extends beyond their circle. The forums were intended to provide the patients with an opportunity to connect with each other creating opportunities for previous

This information transparency around medication might provide opportunities in creating a visual reference with which the patient could accurately confirm their medication.

patients to support current patients and future patients to connect with existing patients. This public option might also allow a patient to connect with people that have shared their condition and further develop a community of support. Under the public domain we also felt the hospital could actively engage with the public; suggesting questions for feedback and further broadening the reach of the hospital community into an engaged public discussion.

While an 'info' menu item was included in the initial prototype the mock-up was built out in the versions which followed.

Part of our future planning within the design of this app was to assume a possible integration with the pharmacy. It was our hope that by receiving live and up to date information from the hospital's existing database, we would be able to offer the patient an up-to-date reference. This information transparency around medication might provide opportunities in creating a visual reference with which the patient could accurately confirm the medication they needed to take.

User Case Scenario

After reviewing the preliminary app with the design team we decided to alter our approach to match the global idea within this initiative of the "Patients First!" focus. What this meant for our design over all was a shift in focus from providing background and context to the care team, to building an application that was created around the functionality that the patient would utilize during their stay.

This app is designed for bedside use, as the patient becomes physically and mentally available to engage with an iPad in their hospital bed. The team sees the nurse orienting the patient to the app following their shared viewing of the patient briefing video, which is or can be viewed directly from the iPad. The app at this point is to be used while living within the hospital walls.

Circle of Trust

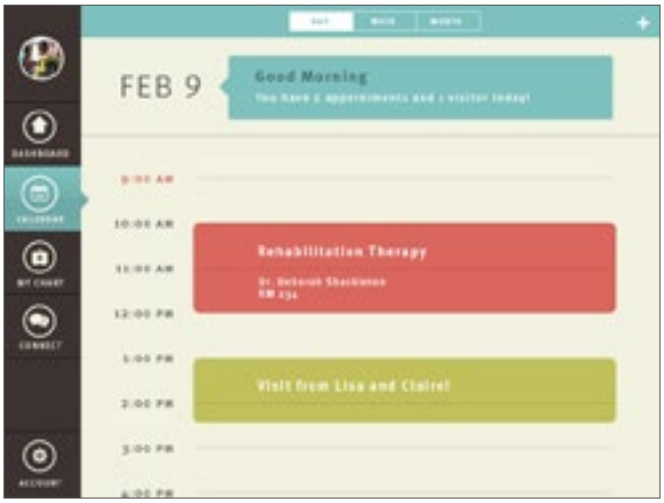
As a result of this change the design of the app shifted to focus more on the "*circle of trust*". The revised app has greater focus on the patient at the centre of the circle, with the care team as supports. The circle would be automatically populated utilizing the hospitals scheduling system to orient the patient to all the medical practitioners, inclusive of their nursing team, doctors and allied health professionals. Background information would be provided on the team, allowing the patient to feel connected and engaged. The design team felt that in the engagement with the *circle of trust* there was an opportunity to celebrate and commend the care team on their successes by "Up-Voting" someone in their circle.

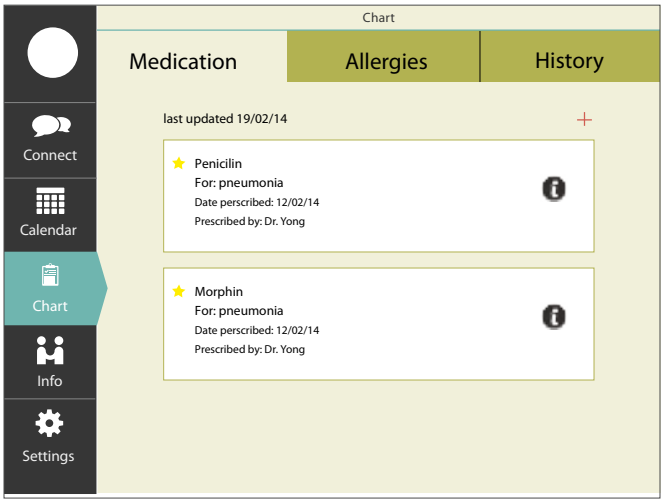
Calendar

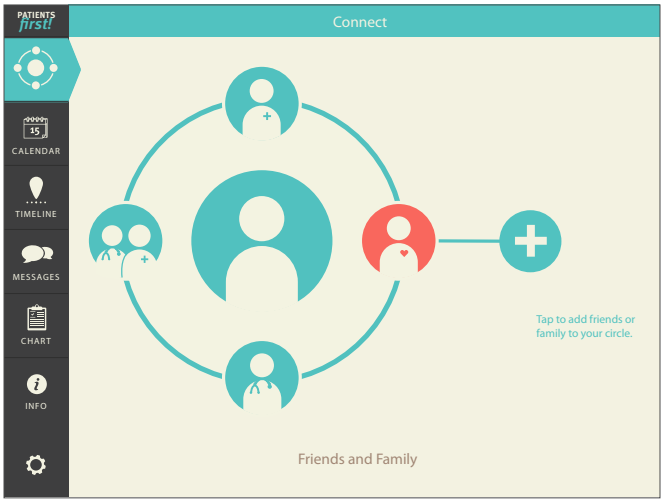
The calendar functionality was improved by adding medication reminders linking to images and background information on the pharmaceu-

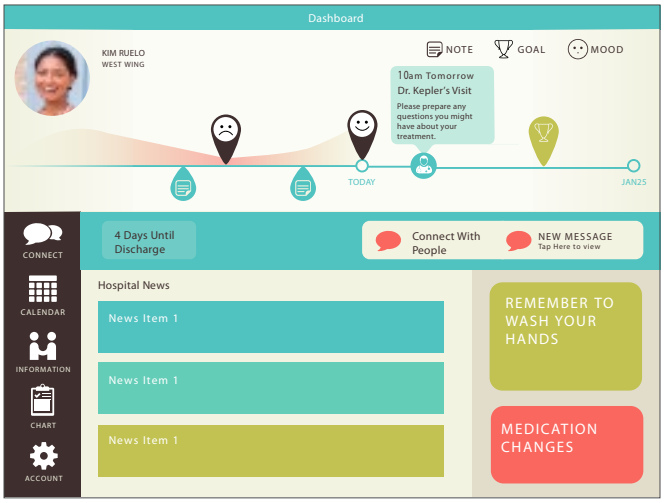
User flow Ideation

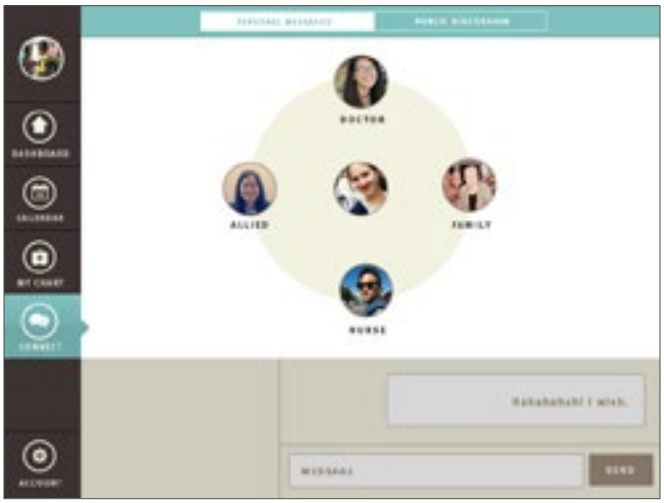
A user flow walkthrough, which we used to refine our ideas for what would go into the app and how everything would fit together.











tical prescribed. When selected, this reminder will pictorially display the medication, quantity and description of pills to be taken at that time. Appointments were improved by adding links to the practitioner background. Also added to the invitation was a link to maps, which indicate to patients, friends and family where appointments are being held. Finally, a field was added to the appointment enabling notes to be left against an appointment. This allows all those in the *circle of trust* to leave appointment related messages in a similar manner that was described in the preliminary design's timeline. Now, friends and family can advocate from afar by leaving reminders and notes against a particular appointment in order for the medical team to refer to when meeting with the patient at the appointment.

The 'mood' functionality changed to a 'check in' however maintained much of the same functionality as in the preliminary version. Added to the timeline was the 'give feedback' icon. This function was added to the app in order to gather feedback much in the manner that the website "TripAdvisor" gathers customer feedback. Patients are able to openly express their experience in the hospital in addition to rating said experience. This was added to the timeline section of the app as we felt that this was the space for qualitative assessment.

Messaging

In the preliminary design we were nervous to overload staff with digital communication instead of encouraging more face-to-face interaction with patients which our research told us was the preferred method. In order to moderate the possible communication overload, we decided to leverage another design solution that the Emily Carr team is providing for Fraser Health; Patient Smart Boards.

When creating a message patients can select any combination of the following options: Unit Coordinator, Smart Board in addition to all, or selected members from their friends and family. All chats within the app appear in a similar manner as iMessage, allowing users to click from a list of contacts and transitions between a chat screen with speech bubbles and a chronological rolling list of historical chats.

Personal requests of the patient's medical care team are directed to the Unit Coordinator who manages the request from the nursing station and alerts the requested person that there is a message from a patient. This communication between the care team would unfold as it does in the current world – the app simply offers a tracking mechanism and an opportunity for a collection of the Circle of trust to have input on a conversation.

If the patient selects the Smart Board the message is made public. It is only in this case that the messages would be made available to people who pass by the screen. Should the patient select any person in addition to the smart board this message will appear as a notice on the board and as a message. Alternately the patient can simply

Circle of Trust
The *circle of trust* orients the patient to all the medical practitioners, inclusive of their nursing team, doctors and allied health professionals

post notices to the Smart Board as a general message to those entering the room such as "Should a visitor come, please don't hesitate to wake me" or "Please ensure visitors do not wear perfume in this room as I am highly sensitive". These public announcements will also be tracked within the app as though they are a conversation.

Personal conversations with friends and family however remain private within the bedside iPad and mimic the configuration of iMessage in offering a menu of recipients that can be conversed with as a group or as individuals. This style of communication allows the members added to their *circle of trust* to choose the mode which they would like to be communicated to in. When a patient engages in conversation with someone in their circle this means that it will automatically default to this mode without the patient needing to enter in any contact information, they simply need to select the name of the person or people they wish to engage with. Should people within their medical team be open to receiving message from the patients they could also set up their account for direct messaging in a specified mode of communication.

Chart

The chart portion of the app has been simplified to mainly data which will be auto populated by hospital systems. After considering the initial option of personal data entry the team was aware of possible additional medical error occurring as a result of patient data entry error.

PATIENTS first!

Connect

CALENDAR

TIMELINE

MESSAGES

CHART

INFO

Nurse

Benjamin Sailor
Registered Nurse

Zoe Shawn
Registered Nurse

Tap to add a Nurse to your circle.

PATIENTS first!

Connect

CALENDAR

TIMELINE

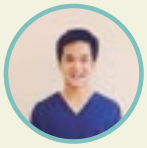
MESSAGES

CHART

INFO

CAREGIVER PROFILE

DONE



Benjamin Sailor

Registered Nurse

EXPERIENCE

Ben has always wanted to work in a hospital. He has just started working at Royal Columbian after graduating from College. Ben has alot of experience with sports injuries after a highly successful adolescent career in Junior Hockey.

A LITTLE ABOUT BENJAMIN

Ben loves Hockey - REALLY loves hockey. Test his hockey knowlege next time you see him but look out - he wins his hockey pool every year.

HAS BENJAMIN DONE SOMETHING TODAY TO MAKE YOUR DAY SPECIAL?

Show your appreciation for Ben by giving him an upvote!

« Connect
Patients were to navigate through their *circle of trust* by selecting a group then watching as the circle expands and moves

The medications tab provides a high-level quick reference data on all medication the patient is currently taking. Much like the previous version, selecting a particular medication will provide an option for a more granular level of information on the drug that is written in common English.

The allergies tab was simplified to provide a quick and easy way to add allergies to the patient's account. Patients would search for a specific allergy and provide notes on what type of reactions they have.

Info

The information menu has been designed to provide all the contextual hospital information that might typically be found on the Fraser Health website or within your existing brochures. This area of the app is available to all members of the *circle of trust* without granting permissions. This enables all those connected via that app to have access to important information just as infection control standards, checking for medication errors, and preventing slips and falls. The information menu will also link the viewer to the live Fraser Health Twitter feed and the patient briefing video which the patient will have reviewed upon arrival to the hospital. Also within the info menu is an 'around the hospital' option. This links to a new page that orients the viewer to the hospital. This area leverages the iPad's GPS system in demonstrating the viewer's location within the hospital. Areas of the hospital and immediate neighborhood are searchable within this screen and the user can be directed from their current to desired location. We see this functionality being leveraged in the patient, friends and family's navigation of the hospital. Friends and family may also use this functionality to source goods close by such as food & flowers offering helpful information such as hours of operation and written directions. Once the desired item is selected within the search list the item becomes highlighted within the map.

Should the patient be looking for additional information regarding their condition or friend and family are looking to learn more general information about a diagnosis, a phone number is provided.

Settings

There are two functionalities within the settings menu. The preliminary screen is for the patient's personal account. This screen uses simple interactions in order to moderate the manner in which the app engages you such as enabling push notifications for alerts such as appointments and medication reminders. Also within the personal settings the patient is able to set the text size, password activation and can change the language if English is not their preferred mode of communication.

The second function of the setting screen is to alter permissions or remove members from friends and family within the *circle of trust*. This allows patients to refine security settings that

Calendar Function
The app provides patients with current information and events pertaining to their facility, and features safety tips

are already generalized from the initial request to add the person. For example, the calendar may be made available however some individuals within the friends and family may only be able to see 'busy' or 'available' time where as others may not be able to book appointments within the calendar.

Future

There are key elements which the Emily Carr team is keen to work towards in possible future iterations of the Fraser Health app. As suggested through our research we can see how a Smart Board will easily interact with an iPad by possibly utilizing the tablet as a remote, populating communication to the smart board and or broadcasting public information that relates specifically to the patient such as social events for those with similar diagnosis, personal messages and rehabilitation activities.

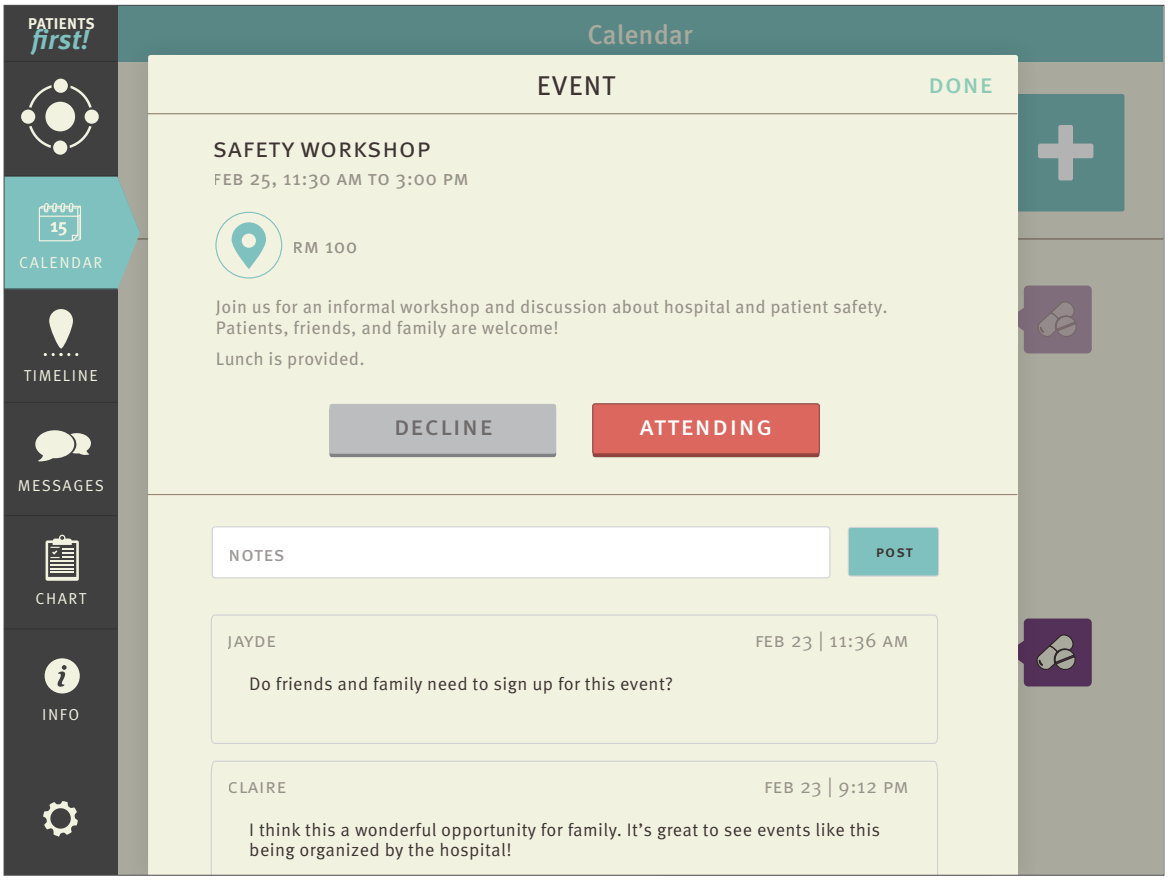
The integration with a possible EMR or projecting possibilities into integration with an EMR would offer significant opportunities to expand the capabilities of the app to enable wellness and advocacy. Managing medical information with the same "Patient First!" attitude could bring forward new possibilities which may not be considered in the first Care Team focused EMR system. Much of the work here lies within making results, diagnosis and medical histories accessible while making the information readable and easy to digest for patients. There are also interesting opportunities in making this app the central hub for dictation, diagnosis and other modes of practitioner entered data.

There are also opportunities within registration with possibilities of simply entering a PHN and allowing patients to validate information from within the app.

CONCLUSION

Patients First! is the result of a successful collaboration between Fraser Health and Emily Carr University. Without the involvement of Fraser Health, our primary research would have been significantly less robust; their part in this process was invaluable. Learning from individuals in the field, both as staff and patients, was an informative and thought-provoking experience, and gave us a great level of understanding into the hospital. Patients First! is a concept centred around patient care; by acknowledging the patient as the key element of health care interaction, we hope the hospital can become a much safer place.

We would like to extend our gratitude to Fraser Health for their involvement in this project, and to all of our co-creation participants for their creativity and openness. We hope that our research can pave the way for similar projects in the realm of patient safety.


PATIENTS first!
Calendar
CALENDAR
TIMELINE
MESSAGES
CHART
INFO
EVENT
DONE
SAFETY WORKSHOP
FEB 25, 11:30 AM TO 3:00 PM
RM 100
Join us for an informal workshop and discussion about hospital and patient safety. Patients, friends, and family are welcome!
Lunch is provided.
DECLINE
ATTENDING
NOTES
POST
JAYDE
FEB 23 | 11:36 AM
Do friends and family need to sign up for this event?
CLAIRE
FEB 23 | 9:12 PM
I think this a wonderful opportunity for family. It's great to see events like this being organized by the hospital!


PATIENTS first!
INFO
CALENDAR
TIMELINE
MESSAGES
CHART
INFO
PREVENTING FALLS
DONE
1 Always ask for assistance
Some patients may experience weakness due to muscle loss when admitted for as little as a few days. Do not hesitate to ask for assistance when getting out of bed, even just going to the washroom.
2 Wear proper footwear
You can also take further precautions to reduce your risk of falling and injury by making sure you are wearing rubber-soled footwear and envisioning your walking path.
3 Ask questions
If you are unsure about any care instructions in the hospital, or take home instructions, do not hesitate to ask one of your care providers for clarification.

Proposal:
ECUAD/Fraser Health Phase II

EXECUTIVE SUMMARY:

The Health Design Lab at Emily Carr University of Art + Design (ECUAD) is proposing to continue with the next stage of Fraser Health's *Keeping Patient's Safe* initiative. Phase II of this collaboration will include pilot/user testing of deliverables from Phase I, implementation strategies, further patient/physician input, further analysis of Phase I research, and a communications strategy which would steer a larger cultural change across all FH sites. Phase II would ideally launch in September, 2014, with preparations beginning this spring.

CONTEXT:

In Phase I of this project Fraser Health asked the Health Design Lab to provide a fresh perspective to help uncover and design innovative, perhaps even provocative, modes of encouraging a safety culture in their hospital settings.

This project has included:

- A public co-creation session, with approximately 62 participants
- Ethnographic probes with current patients at Abottsford and Eagle Ridge Hospital
- Six co-creation sessions with a total of 75 participants from various groups across the working spectrum of the health authority, as well as the patient advisory council
- Extensive research analysis including a literature review, precedent review, co-creation activities, affinity diagramming to identify themes/clusters of topics, cognitive mapping to develop core principles for action, and triggers and scenarios depicting possible outcomes

From this evidence-based qualitative research, we have developed the following designs/strategies for Fraser Health:

- Patient briefing video
- Tablet based app
- Communication board strategy

BRIEF FOR PHASE II: IMPLEMENTATION AND ROLLOUT

Implementation Strategy

- Development of a communications/branding strategy which would steer the overall organization's cultural change towards *Keeping Patients Safe*
- Creation of all strategy deliverables, eg posters, web banners/ads, brochures, etc.

Educational Support Materials

- Creation of materials to support staff education on new strategy
- Creation of materials to support public education on new strategy

Patient Briefing Video

- Consultation with different groups around specific content
- Provision of revised video and animation con-

tent in final professional form (ie with actors/ professionals in a real hospital setting)

- Testing with patients
- Trial implementation and testing in a focused pilot launch
- Adjustments made as necessary

Whiteboard Implementation

- Testing with patients and staff
- Trial implementation and testing in a focused pilot launch
- Adjustments made as necessary

Feasibility study for networked monitors

- Examination of existing technologies (hardware and software)
- Selection and costing of specific applications
- Testing and configuration of two monitors as "proof of concept"

App development

- Consultation with different groups around specific content
- Consultation with Fraser IT department , privacy personnel and external app developers to establish feasibility
- Limited distribution for testing purposes
- Refinement of interface and content
- Work with external developer to provide content as needed.

Physician Testing/Input

- Collect further research/opinions from physicians (additional interviews etc)

Further Research Analysis

- An incredibly rich body of research was collected in Phase I. Phase II would see further analysis of this data towards the implementation of further design strategies

We look forward to continuing our collaborative partnership with Fraser Health. It has been an immensely rewarding project for the Health Design Lab and we hope to continue the work through to the next phase.

Jonathan Aitken
Director, Health Design Lab

Appendix

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Appendix Item B:
Video Script

PATIENT BRIEFING VIDEO SCRIPT

A short patient briefing video was designed and produced to encourage positive partnerships between the care team and patient. The video functions as an educational tool to promote patient engagement, involvement and responsibility through the animated graphics and live content. The time during patient briefing can provide the opportunity to establish a positive interaction between the patient and care team. We focused on introducing the following key points surrounding patient safety: introducing the care team, infection control, medication error, falls, ensuring patient comfort, and discharge. As well, we wanted to introduce the usage of the app and whiteboard. Further, the content within the video, informs the patient of the various safety protocols to be aware of in order to promote a sense of empowerment and responsibility, before the start of care. The following documents the script used in the video.

Fraser Health Logo is introduced and fades away

Fraser Health is British Columbia's largest health authority and we have developed a new initiative focusing on patient care that puts you in the center.

Patient with healthcare team graphic showcasing patient at the center of doctor, nurse, health professional and family

This initiative looks at patient safety and the shared responsibility between you as a patient and your healthcare team.

Healthcare Team graphic highlights each team member based on introduction eg. Nurse icon highlights when talking about nurse

This is your primary healthcare team, it consists of a nurse, who is here to help with your day to day care, a doctor who looks over your overall health, healthcare professionals who treat specific areas of healthcare and your family and friends who are there to help you on your path to recovery.

Healthcare Team inner circle fades to the background and reveals outer circle

We have highlighted some specific aspects of your hospital experience and some suggestions that can help increase your safety while in the hospital.

Patient Briefing Video

This video acts as an educational tool to promote patient engagement, involvement and responsibility

They are:

Zoom on spread of infection icon in outer circle and move through either video or photographs with narration below

Infection Control:

200,000 patients get infections every year while receiving healthcare in Canada, and 80% of these common infections are spread by healthcare workers, patients and visitors.

So, here at Fraser Health we take infection control seriously. That's why we consider hand washing to be critical in helping to control infection. Our goal is to reduce this risk. When anyone approaches you make sure you wash your hands together. You are an important partner on our healthcare team, so we ask you to please speak up to nurses, doctors, and your family members to ensure they wash their hands along with you.

Close up of Spread of Infection icon and zoom into Medication Error icon and move through either video or photographs with narration below

Medication Error:

Preventable medical errors contribute to between 9,000 and 24,000 deaths in Canada a year.

Taking the wrong medicine, or the wrong dose of a medicine could harm you. We take every precaution to ensure you are receiving your accurate medication, but while mistakes can happen, but they are preventable. To help us, it is very important that you and your family members are aware of what medications you are taking at the

moment. If you are hesitant of your medication or what they are for, or if you don't recognize any pills, we ask you to speak up and ask us.

Close up of Medication Error icon and zoom into Fall Prevention icon and move through either video or photographs with narration below

Falls:

In an average hospital there will be around 24 falls every week. Which means over 1,260 falls every year.

Falls are avoidable, and we want to keep them this way. We are always here to help, so if you need assistance standing up, please let us know. You can also take further precautions to reduce your risk of falling and injury by making sure you are wearing proper footwear and envisioning your walking path. Some patients may experience weakness due to muscle loss when admitted for as little as a few days, so it is important to speak up and let us know if you need us to lend a hand.

Close up of Fall Prevention icon and zoom into Home icon and move through either video or photographs with narration below

Home:

It is important that you continue your follow-up care with any recommendations from your healthcare team and bring that information home with you. If you were given medication, it is important to follow the instructions provided by your healthcare team. If you are unsure of any material that was given to you, please make sure to speak up and let us know.

Zoom into patient graphic

Patients First!

As a patient you are the focus of our care at Fraser Health, and we have developed two ways to help you take control of your own healthcare.

Show graphic for app and whiteboard and move into both descriptions

The whiteboard is here to help you communicate with your healthcare team and family members. You can use it to:

- let your nurses know what you need
- let your family leave a brief note for the next shift
- let your nurse leave a note for your family
- keep track of appointments

We have also provided a free app for you to use on an iPad while you're here in the hospital, and you can also download it for free when you get home. You can use it to:

- keep track of appointments
- store information related to your care
- communicate with other patients and your family
- communicate with the Fraser Healthcare team

Thanks for making safety a priority. At Fraser Health, we put patients first!

Appendix Item C:
Physician Phone Interview

PHONE INTERVIEW WITH DR. DAYAN MUTHAYAN OF FRASER HEALTH

Interview conducted by Jonathan Aitken, Director, Health Design Lab, Emily Carr University on February 11, 2014

As a further inquest during our primary research phase, Jonathan Aitken conducted a phone interview with Dr. Dayan Muthayan, a Fraser Health physician. Dr. Muthayan gave permission to quote and attribute, however please note that the following is not a transcript of the conversation but rather a series of notes taken during the interview.

---

1) We've been asked to consider ways to enhance patient engagement and responsibility for their healthcare. How do you feel about that? Would it seem to be a useful initiative?

Excellent idea, we should be doing more of it.

2) How do you think we might build a patient/healthcare provider relationship to increase safety in hospitals?

Asked whether this was focused only on hospitals or the wider, full community. [he thought it should be the full community] Wants much more public education to facilitate a more educated/knowledgeable public regarding healthcare and options. Right now people often don't know where to go and default to the emergency departments. They seem to not understand the difference between emerg/non-emerg. This is made worse by long wait times to get in to see a family physician (often 2 weeks). Suggested we look to European models, where he feels population is more engaged with their care. They know where to go, we lack this in Cananda. There needs to be some form of "in-between" care, things that are not emergencies, but too urgent to wait for 2 weeks.

3) What have been some of the approaches you have used to foster patient safety? How were they received by the patient?

As a doctor, he strives to take the time to talk to his patients. But as he ends up repeating the same message over and over, he could use better support materials. For example, patients often wait upwards of 2 hours in emerg, why not use this time to educate? There are existing news channels on TVs in hospitals, but this could be used more effectively. At a broader level, he indicated that with the system struggles with low resources. Education, ie long-term strategies, are often cut first. More funds are directed to current, urgent initiatives, than long term strategies. We need to invest in support for the future.

4) Do you think there is a power imbalance between patients/patient families and healthcare providers?

Yes, a tremendous imbalance. Generally, there is an attitude that because patients don't pay (at

least not directly) we don't use a client-based model, we're not serving them well. We [healthcare providers] feel that patients waiting is normal and expected and that they should feel "grateful" and "wait their turn". The way that is said can have a huge impact. Often it's directed authoritatively to patients in emerg asking for a sense of wait times. Thinks we can do a lot better, treat people as if it were a service industry.

5) Medication errors were indicated as one of three areas of patient risk—what do you think is the specific source of this?

Handwriting [physician] a large source of error. Need to move completely to computer generated Rx.

6) Falls?

There's a broad lack of understanding among healthcare providers as well as patients and their families about how quickly the elderly lose muscle strength while confined to bed. In as few as 3 days, they can start to lose muscle bulk and fall where they wouldn't have before. We need to warn patients and their families about this and make sure healthcare providers understand that a person who was admitted with no predisposition for falls may become that way.

7) Hand hygiene?

Doing a lot already, good general awareness.

8) How would you feel if you were directly challenged by a patient as to whether you had washed or disinfected your hands since the previous patient?

Doesn't matter how the Dr. would feel, they should be challenged. They don't mind. Better to do it in front of patient, reinforces to patient the importance of doing it. He often washes before going in, but the patient doesn't see it. He's trying to change the habit to do it in front of them. [this very nicely supports our idea of ritual handwashing together with patient]

9) How successful do you think current shift handoff procedures are in terms of patient safety?

Thinks it is happening OK with nurses, though may be room for improvement. Doesn't think physicians are doing as well, they should be better. There are no electronic tools for this yet, and should be. Advocates use of EMRs.

10) Would you feel comfortable using an integrated Electronic Health Record system? Should patients have access to that?

YES! EMR needs to happen! Regarding patient access to files, he thinks there are very few situations where it should not happen. (eg psychiatric assessments). Overall physicians are too protective, but patients have a right to that information.

Thank you for your time.

Appendix Item D:
Icon Design

Icon Design »
Initial sketches during the icon design process.

ICON DESIGN & DEVELOPMENT

From our research, we developed icons which represented key themes. These icons were used for design solutions such as the Patients First application, communication boards, and patient briefing. The challenges were to search for, and design icons that spoke the same visual language, and would clearly reflect the content and aesthetic of each design solution.

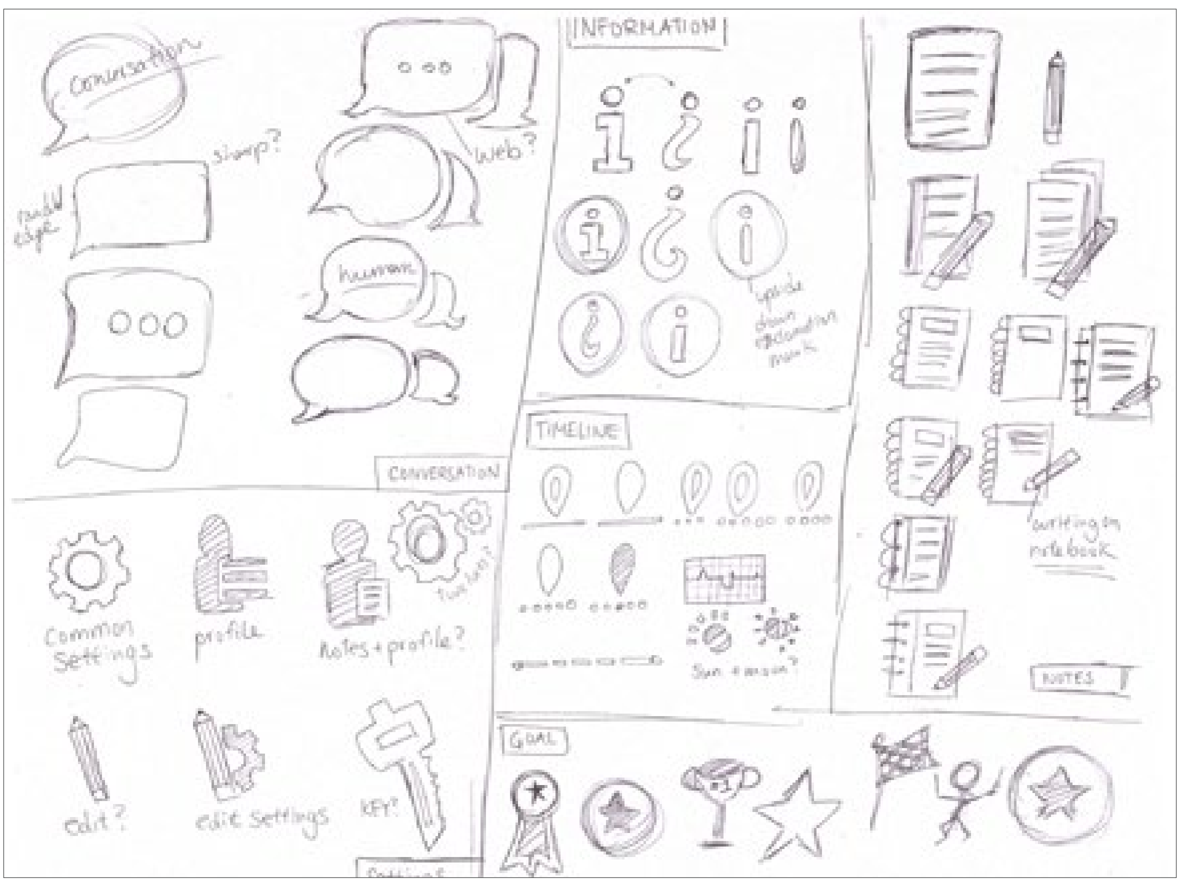
During our brainstorming process, we thought about the icons each deliverable needed. Most icons were for the Patients First Application, the rest for the communication boards, and patient briefing. From the feedback derived from our research, we would develop icons that identifed each section of the application. These icons represented the information, *circle of trust*, timeline, account set-up, calendar, and chart sections. Within these sections, icons were developed to represent medication and medication checks, goals, notes, healthcare takers, falls and injuries, infection control, and up-voting. The icons developed for the communication boards represented conversation, emoticons, day plan, and greetings.

Some icons were selected from online sources (e.g., *www.thenounproject.com*) and edited to be visually consistent with our mood board. Though we could not find appropriate already-made icons to represent the rest of the content, we designed our own. We researched about and sketched objects, gestures, facial expressions that would best represent each subject. Considering the consequence of each representation was essential to ensure clear communication. For example, when we were developing the icon for goals, we were constantly referring to prize ribbons and trophies. We realized that an abstract representation such as a star would be more appropriate. The inspirational phrase was "reach for the stars," which we interpreted as "reach for your goals and dreams, no matter how challenging."

We initially developed the icons in black and white to ensure they communicated the content without the reliance on colour. Then, we selected colours from our master swatches, and applied them to the appropriate icons. These icons were developed to quickly communicate content and thus, were developed with simple shapes and thicker strokes for ease of visibility on screen and on print. Choosing rounded edges were to give a friendly demeanour. These icons communicate a consistent visual language and also speak strongly to our main goal of putting Patients First.

A complete set of the icons developed for the project can be found on the following page.

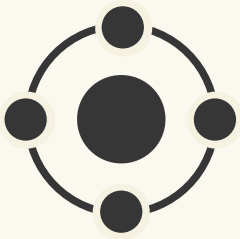

UPVOTE
Like?
Thumbs up?
upvote star?
TICKET!
a vote from you!
One Checkmark?
Two Check marks
FOLDERS
Star with plus Sign?
Smiley
Circle of trust
"positivity"
"inclusive"
"subtle"
subtle, not sharp
BIG THUMBS UP
confirmation
Simple! too much text?
thicker lines
Chart
Clipboards


Conversation
Sharp?
web?
human
CONVERSATION
INFORMATION
TIMELINE
Common Settings
profile
Notes + profile?
edit?
edit settings
KEY?
GOAL
writing on notebook
NOTES

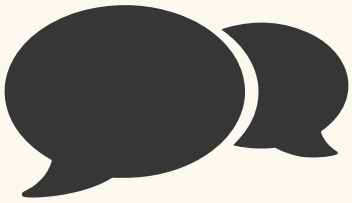
HAND WASHING/
INFECTION CONTROL

CHECKED
MEDICATION

FALLS/SLIPPING



CIRCLE OF TRUST/
CONNECT



CONVERSATION

NOTES

GOALS

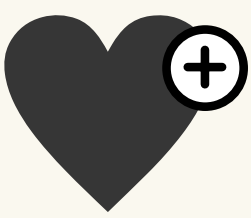
ACCOUNT/
SET-UP

MEDICATION

CALENDAR

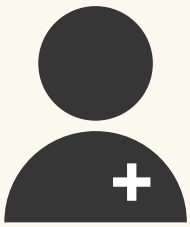
CHART

GREETINGS/
WELCOME

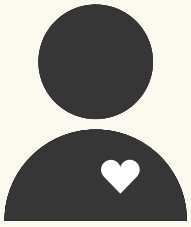


UP-VOTE

EMOTIONAL ICONS



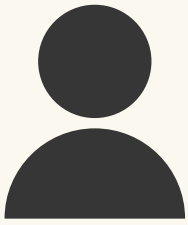
NURSE



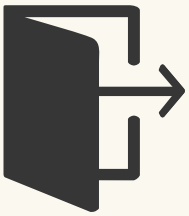
ADVOCATE

DOCTOR

ALLIED HEALTH PROFESSIONALS



PATIENT



SIGN OUT

HOME

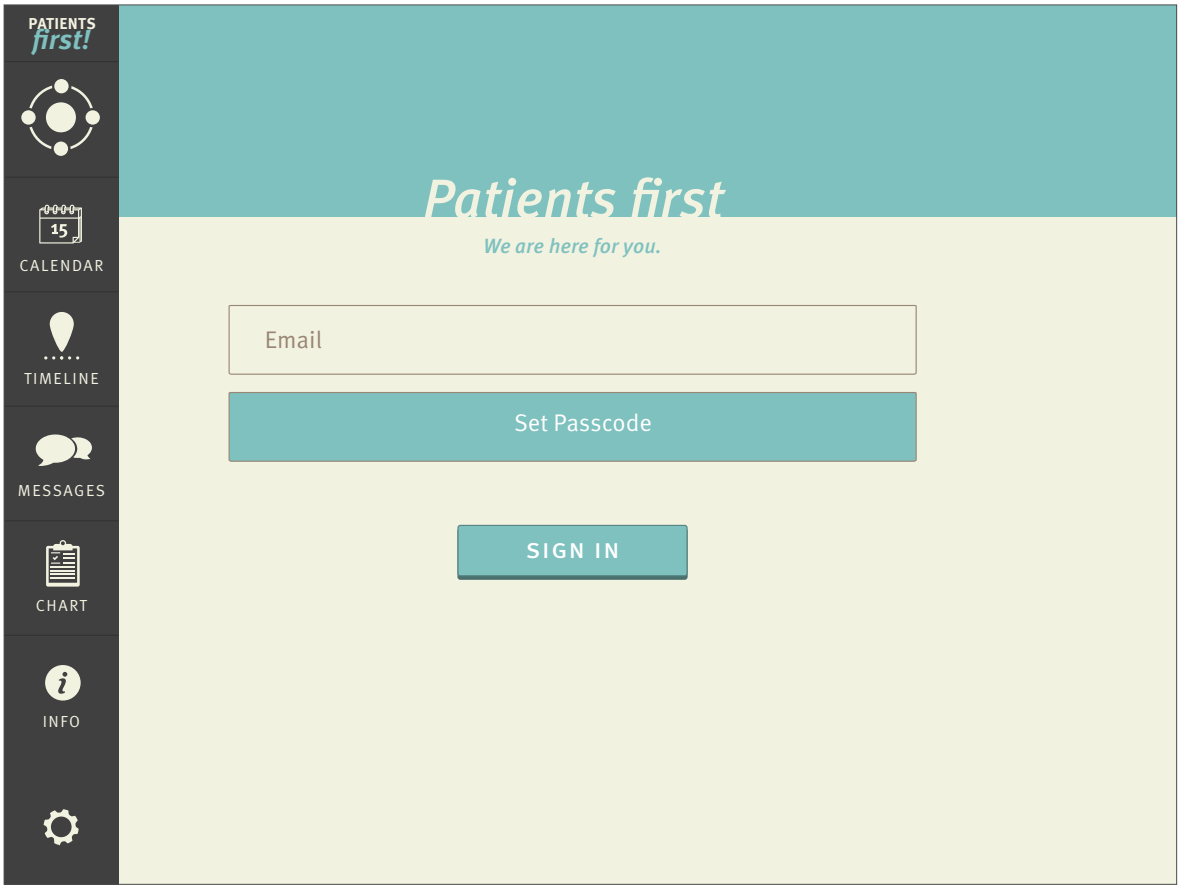
CHECK MARK

INFO

TIMELINE

The following icons courtesy of The Noun Project *(www.thenounproject.com)*:
Hand Wash (Hand Washing/ Infection Control) *designed by Iconathin-a*, Slipping (Falls/ Slipping) *designed by Maurizio Carpania*, Conversation *designed by Murali Krishna*, Notepad (Notes) *designed by Aneeque Ahmed*, Gear (Account/ Set-up) *designed by Cris Dobbins*, Calendar *designed by Michela Tannoia*, Handshake (Greetings/ Welcome) *designed by Alex Fuller*

Appendix Item E:
App Development



APP TECHNICALITIES

We created a working prototype of the patient centred app in order to provide an accurate demonstration of its use on an iPad. We chose to demonstrate the app on the iPad for its simplicity of use, ease of disinfection, and it's growing acceptance by the healthcare community. Future versions could certainly be implemented for other devices.

Importantly, we constructed the prototype using Apple's own development software, Xcode. This offers two important advantages over other prototype platforms: it allows full use of the iPads built in gestural capabilities; the files used can be extended to a fully functioning app in future version. While the app currently does not interact with a server or save any information, the demo can be tapped through to see how it would be used. It has been prototyped with enough functionality to give a good idea of how a patient might interact with the app, use it to stay connected and engage more deeply in their care.

Appendix Item F:
Conceptual Drawings

Patient Introduction
Patients arrive at the hospital and are introduced to the general concept of patients first.

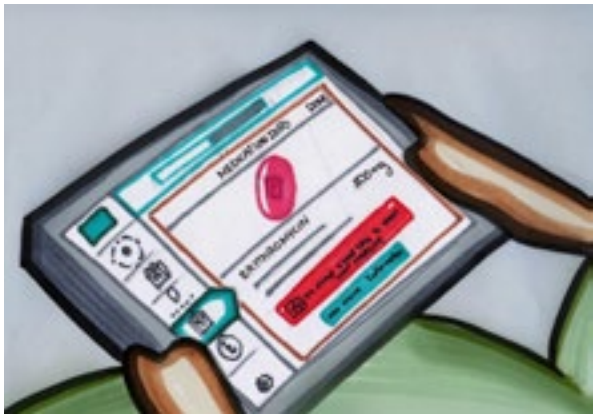
Waiting Room Interactions
Patients and family members of all ages are waiting in the ER room. A interactive display on the wall allows them to view a map, know how long they are waiting, watch videos, and see how they can keep infection in the hospital at a minimum.

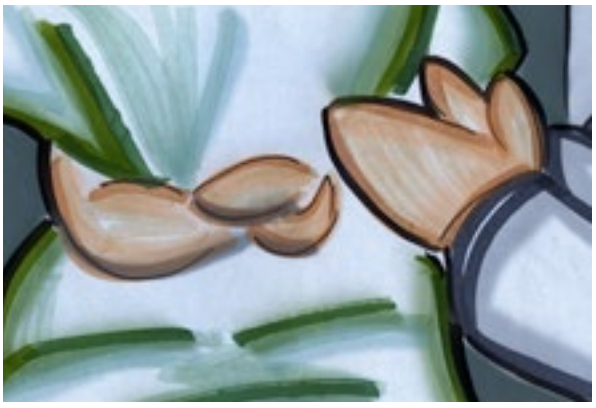
Mobile Whiteboard

The whiteboard is attached to an armature to allow for people with all levels of mobility. Different views of the whiteboard with a handle show how it allows for easy access.

Medication Control

Using family members and the Patients First app, patients are able to take care of themselves and make sure they are taking the right type of medication.





Infection Control Education

Through icons and the app, patients are able to be educated on infection control. Washing hands is thus turned into a shared experience.

After Care Connections

Staying connected with the hospital does not end once a patient is discharged. Through the app, patients are able to stay in check with their doctor, nurse, and also keep a record of how you are feeling.