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User-Centered Design and Covid-19

Insights

- User-centered design (UCD) is applicable in translational research.
- High-quality research results facilitate successful project pivots.
- UCD process and methods helped physicians fight Covid-19.

I was invited to teach at the Translational Research Program (TRP) at University of Toronto's Faculty of Medicine in the Fall of 2019. This is a master's degree program for individuals interested in designing innovative solutions in the healthcare space. The cohort in the class of 33 consisted of one-third physicians; one-third other healthcare professionals including nurses, midwives, and medical administrators; and one-third technical specialists including designers and engineers.

THE COURSE

The course I co-taught was Projects in Translational Research, where students pair up with medical stakeholders to design interventions using design-thinking methods. The class was divided into six groups that each tackled a different problem. One of these groups chose to explore the challenges of adopting virtual care among Canadian medical professionals. The group was made up of three medical doctors, all working full time in academic institutions in various specialties, one medical researcher, and one technologist. All of the group members were female; one was expecting a baby before the end of the course.

I have been teaching design thinking and user-centered design (UCD) courses for almost 20 years in industry, and at various schools and faculties. This was my first time teaching in the medical space, although I have done some consulting projects in

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this space and have medical professionals in my immediate family. The first pronounced difference I noticed during this course was the determination with which some of the groups approached their projects.

USER NEEDS ANALYSIS

This virtual care (VC) group capably executed all course deliverables, conducting primary research among their extensive medical networks and delivering deep insights into their chosen problem space. In conducting their background research and user needs analysis, the team discovered three primary issues:

• *Workflow disruptions.* Physicians did not want the introduction of virtual care into their practice to disrupt workflows in their already busy schedules.

• *Payment uncertainty.* In Canada, provincial governments fund all medical services and have control over which services are funded. Virtual care at the time was largely not a funded service for many physicians.

• *Physicians were interested in VC.* Physicians in Canada were interested in changing their current practices to support patient requests for virtual care. At the time, however, virtual care appointments were supported only through the proprietary, usability-challenged process via the Ontario Telehealth Network (OTN).

The team's research also identified the following barriers of VC adoption by physicians: system barriers, lack of administrative infrastructure, lack of convenience, educational needs, and concerns for patient privacy.

DESIGN PROCESS

The team developed personas, scenarios, and storyboards for how to persuade and educate hesitant physicians to adopt VC into their practice (Figure 1). They then developed low-fidelity prototypes of potential interventions to overcome the identified barriers. Low-fidelity prototyping is a valuable tool used in early design work to embody an early solution idea and communicate it to the target audience. For example, low-fidelity prototypes of digital systems can be drawn on paper, and low-fi service ideas can be acted out—a process also called *bodystorming*. The team's low-fidelity prototypes

intentionally diverged in focus to span the VC problem space and included: flyer for VC education rounds, website for VC support, VC referral form, VC metrics dashboard, and clinical guidelines for VC.

After testing their individual low-fidelity prototypes in class, the team combined insights to produce a higher-fidelity prototype. They iterated their prototype design while honing their newly acquired skills in the user experience research methods of *cognitive walkthroughs* (designers explore their solution by enacting hypothetical users in realistic scenarios of use), *heuristic evaluations* (designers assess their solution following a specific set of predefined best practice guidelines), and *usability testing* (observing real people, ideally drawn from the target audience, interacting with the design to identify challenges and obstacles in task performance). They learned the value of *qualitative user experience research* (less concerned with large sample sizes and statistically significant results and more with observed obstacles during real usage), which differs significantly from the traditional medical research practices with which they were familiar.

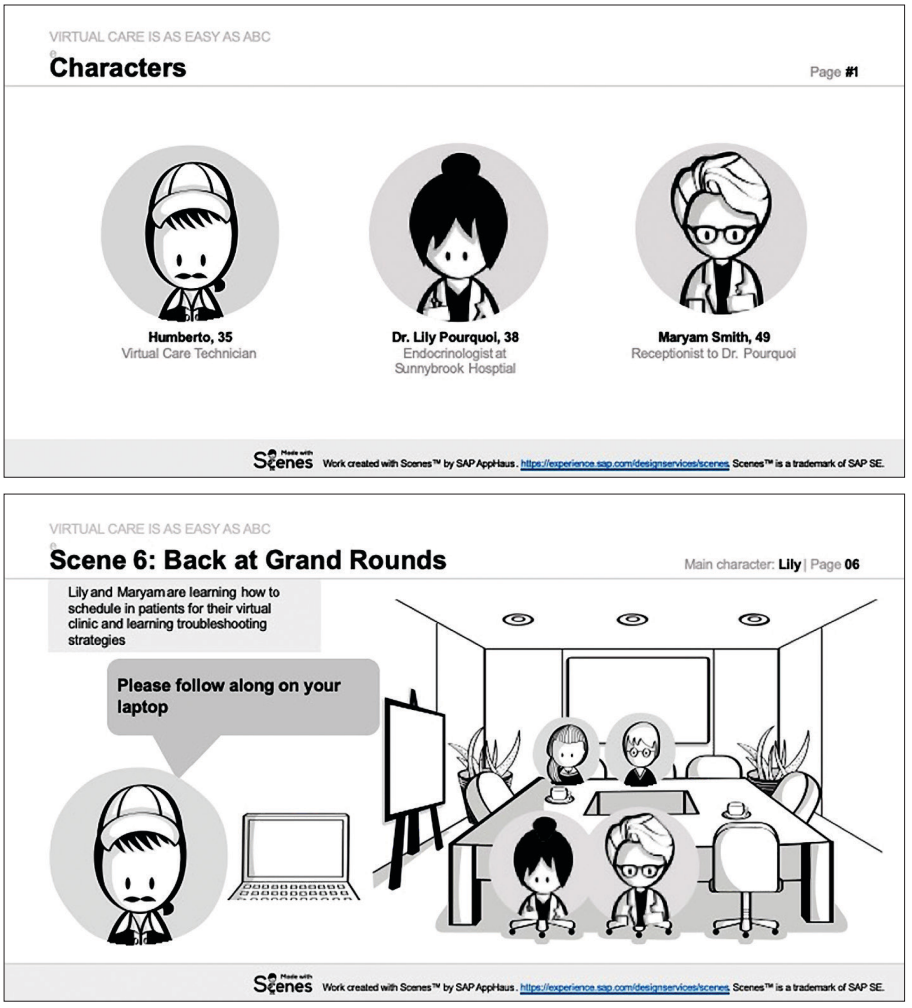

Figure 1. Personas, scenarios, and storyboards of Virtual Care Grand Rounds Education Session.

COVID-19 LOCKDOWN

As the class was approaching the final weeks, Covid-19 forced classes to move to an online format. Our first remote class was on March 12, and by March 16, all University of Toronto classes were being held online. Healthcare providers in the class were now facing significantly increased stressors in their daily work. Many were required to pull out of other commitments, including TRP classes, to focus on their professional commitments.

As Covid-19 limited patient visits to hospitals, patient appointments moved to a virtual format. To allow this to happen, the March 13 bulletin of the Ontario Ministry of Health and Ontario Health Insurance Plan (OHIP) removed the "payment uncertainty" barrier identified by the team's primary research:

In support of the government's efforts to limit the spread of COVID-19 in Ontario, the Minister of Health has made an Order under the authority of subsection 45(2.1) of the Health Insurance Act to temporarily list as insured services the provision of assessments of or counselling to insured persons by telephone or video, or advice and information to patient representatives by telephone or video, as well as a temporary sessional fee code.

The previously mentioned OTN system was up until that point the only way to conduct virtual appointments and be remunerated for them. This system had the reputation among physicians as being overly bureaucratic and underresourced, with a high user learning curve, requiring additional billing paperwork, and prone to dropped video calls. The March 13 OHIP announcement provided Ministry funding for telephone and video visits over any format. What had previously been one of the main barriers to rolling out virtual care across physician practices vanished almost overnight.

Much to the surprise of their instructors, at the final project presentation, the team presented a fully functional design that allowed patients to self-book virtual appointments.

PREDICTED INTERVENTION

Almost prophetically, the VC team's high-fidelity prototype had proposed an educational session on March 20 delivered by Dr. Ilana Halperin to discuss implementation of virtual care. On March 20, OntarioMD hosted an actual webinar to help physicians incorporate virtual care into their

FIGURE 1 ©UNIVERSITY OF TORONTO, STUDENT PROJECT

A8 — Experience Map: Covid-19 State – Virtual Health Care
OTN initial encounters by a clinician in a subspecialty setting

LEGEND: ? Questions in users' mind
Experiences/reactions: + positive − negative

STAGES	ENTICE Research & Planning	ENTER Set up & Prepare	ENGAGE OTN encounter	EXIT Finish	EXTEND Share Feedback
People	Physicians Administrators	Physician ~~IT Support~~ Admin Assistant ~~Patient~~	Physician, Patient Nurse ~~Admin Assistant~~ ~~IT Support~~	Physician, Patient Admin Assistant ~~Support Staff~~	Colleagues Hospital Staff Administrators Patients
Context	In office at hospital At home	~~In office at hospital~~ At home	~~In office at hospital~~ Outside hospital setting	In office at hospital Outside hospital setting	At hospital Online, At meetings
Thinking	~~How it helps me~~ ? ~~Maybe time to try~~ + ~~This is inefficient~~ − Changes workflow − I have no support −	~~Do I need equipment~~ ? How will I document ? Where to get setup ? Who will set it up ?	Difficult to examine patient − Pixelated images − Difficult to document − Convenient +	How to do referrals ? How will I bill ? How to keep notes ? Do I keep this up ?	Need more support − Need infrastructure − ~~Patient content~~ ? ~~Privacy matter~~ ?
Feeling	~~Hesitancy~~ − ~~Reluctance~~ Concern Curiosity +	Anxiety, Discomfort, Unfamiliarity, Stress − Excitement +	Concern − Empowerment, Satisfaction +	Frustration, Dissatisfaction − ~~Technology reliance~~ Convenience +	Mixed feelings + − Ambivalence about next encounter ? ~~Future use~~ ?
Actions	~~• Calling OTN~~ • Looking for help • Literature search • Talking to colleagues	• Get equipment, software ~~• Register for OTN~~ ~~• Setting up a space~~ • Choosing patient • Confirming appointment	• Call help number • Access to patient chart • Calling patient ~~• Troubleshoot setup~~ • Consent patient	• Document note • Send referrals • Discuss with Admin ~~• Billings~~	• +/- Feedback ~~• Discuss with IT~~ ~~• Discuss with Execs~~ • Book next patient • Share experience
Touchpoints	• Department email • Executives • Websites, News	~~• Purchasing & setting up~~ ~~• Liaise with OTN~~ • Help pages, manuals	• Troubleshoot equipment • Dialing in • Adjustments to phone	• Working in EMRs	• Workflow efficiency • Brag • Complaining

Figure 2. The experience map, which the team initially used months earlier to reflect their background research, was updated to express the latest Covid-19 state of virtual care.

practice. Topics that were addressed included new billing codes, workflow integration, technology choice, and patient selection—similar to the learning objectives the VC group had proposed. And Dr. Halperin happened to be one of the speakers! This online session was attended by 300 Ontario physicians. The group's visionary prototype design had been implemented independent of their input. They could have wrapped their project right then—victorious.

PIVOT

However, physician training instills the instinct and drive to problem solve and help in emergency situations. Covid-19 was an emergency. Doctor's offices and clinics had shut down. Ontario, along with the rest of the world, came to a standstill as shelter-in-place edicts were announced by governments worldwide. The physicians' day jobs kept them on the front lines dealing with the pandemic in hospital emergency departments and inpatient settings. The new challenges ignited innovative opportunities to problem solve and help.

The VC team took their newly acquired design-thinking and user experience research skills to the Covid-19 front lines. Identifying needs for novel interventions and workflows, the group applied their foundational research insights, updated their experience maps (Figure 2), and pivoted their design.

Much to the surprise of their instructors, at the final project presentation, the team presented a fully functional design that allowed patients to self-book virtual appointments, which automatically scheduled video or phone visits and sent out reminders (Figure 3). They had piloted this design in record time following the course methodology and had begun to implement this into their medical practice.

REFLECTIONS

The group reflected on their takeaways from the Projects in Translational Research course:

▶ *I really believe this course challenged me to think outside of the box and apply new concepts to real-world problems in healthcare.*

▶ *The major takeaway point from this course for me is the need and importance of usability testing in general. In healthcare, this is often a neglected tool, and interventions are implemented without any iteration. This is perhaps why hospitals are stuck with archaic electronic patient records that are extremely difficult to navigate. These system inefficiencies can definitely be improved through prototyping, usability testing, and the various design tools we learned through this course.*

▶ *Each group member was invested in the problem. Had we not spent the number of hours doing primary and secondary research, it would have been difficult to pivot. Each of my group members brought complementary strengths that we built on.... I will use the skills I have learned from this course, usability testing with*

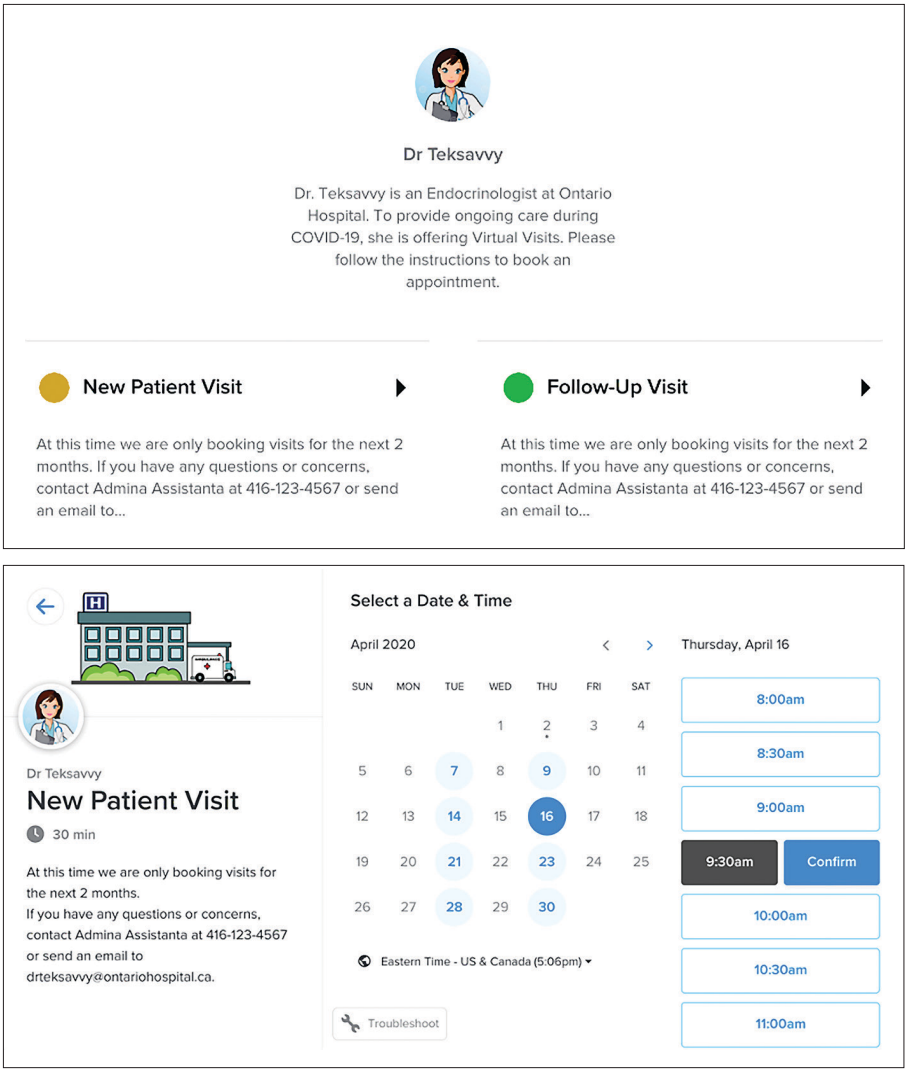

Figure 3. New workflow prototype "Administrative-free platform for appointment booking during COVID" using Calendly.

low-fi prototypes, heuristics, and cognitive walkthrough, for the design of future prototypes. Working in a group with non-clinician members was very beneficial in understanding aspects that I previously would not have asked related to IT, industry, and administration. In the future, I will seek out non-clinician perspectives. I have gained a greater appreciation for the value and the groundwork needed to design a prototype, whether it is a flyer, an application, or a service.

▶ *I previously assumed as an academic physician that my work time would be divided between clinical responsibilities, teaching responsibilities, and research. However, this course has shown me that I want design work to be a part of what I do. I found it challenging but also incredibly stimulating and rewarding. I love to solve problems; I love creating; I love finding tangible solutions. To do this in healthcare to address the real problems is the dream.*

CONCLUSION

As a user experience consultant for the past 30 years, I have worked in diverse industries on many interesting projects, both successful and not. As an educator, I try to make students aware of our limited perspectives (a.k.a. keyholes) and show them how to expand these limits with UCD. This case study included themes often encountered on successful projects:

• *Multidisciplinary teams* enabled access to larger social networks, expanded an understanding of the problem space, and contributed to the creativity of the solutions.

• *Motivation is a great driver.* The team members chose their respective careers motivated to help people by solving complex medical problems. Although formidable, Covid-19 was another such problem. Covid-19 constraints were incorporated into design solutions, under severely compressed timelines. The team continued to pivot toward a real actionable solution.

• *UCD methods are robust and generalizable.* The project foundation was strong and persisted throughout; early user needs assessments and clear project objectives never wavered. The team of professionals who were trained to gather patient histories and distill long lists of symptoms into diagnoses quickly adopted the UX research methods. UCD tools and techniques were applied successfully following limited guidance.

• *Quality requires iteration.* Good designs are rarely born fully formed. They evolve by first focusing deeply on real people, their problems, and their needs. Iterating designs with user feedback, from low to higher fidelity, follows. Along the way, the willingness and ability to pivot as new developments arise are key.

This project demonstrated the power of scaling and democratizing our UCD practices. I hope that critical problems faced in the world today can be challenged by motivated teams with UCD.

ACKNOWLEDGMENTS

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