Designing New Hospitals - Who Cares About the Patients?

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ABSTRACT

The design of hospital environments and processes impacts patients' experiences and feelings. This paper explores how patients' experiences are considered in the design process of new hospitals, specifically focusing on the use of co-design methods including patients. Prior work, largely focused on improvements to ongoing care processes, has highlighted a variety of challenges. Our investigation reflects on observations from weekly planning meetings and the use of virtual reality tools in the design phase of two new hospitals. Our findings suggest that, although opportunities exist for patient experience-centric innovation, the tight schedules and intangibility of new-build limit what is achievable.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**.

KEYWORDS

Hospital design, patient experience, healthcare services, co-design, service design, virtual reality

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1 INTRODUCTION

Hospital design ranges from exterior architecture to interior decoration, and from specific interactions to entire processes. Hospitals are places for the sick, infirm and mentally sensitive, and must serve all ages, genders and various cultures. Hospitals are places where people face fear, trauma, frustration, and happiness. Unavoidably, hospitals are also places of waiting. There is a large body of prior work highlighting the impact of hospital design on clinical outcomes and the satisfaction levels of patients, staff and visitors [8, 17]. Factors with the highest impact include; reducing noise levels, providing nature views and natural lighting, providing single rooms, and low stress wayfinding solutions.

Patients' experiences of hospital healthcare services are not only based on their clinical care, but are heavily influenced by emotional experiential issues, which in turn affect clinical outcomes [13]. One common approach to including the patients' voice is through patient satisfaction surveys, [11]. However, whilst such data has been widely collected, the main challenge is ensuring the issues are understood and acted upon throughout the hospital's organisation [11]. Additionally, such largely quantitative survey-based methods have been criticised as not exposing the nuances of patients' experiences, needed to improve relational and experiential aspects [14]. The use of participatory co-design methods including patients has been proposed as an approach to overcome these limitations [1, 15]. However, this may not be optimal in cases requiring high process investment and potentially exposing tensions between patients and staff [2].

Against this background, we explore the use (or non-use) of co-design methods in two new hospital builds, aiming to identify who really cares how patients experience the healthcare services. We firstly review the design methods that are currently used in hospital design, and how patients are involved. Following this we open discussion on the challenges, needs and good practices of applying patient-centric co-design methods in this domain. We explore the issue through expert interviews with those who have been in key roles managing new hospital builds and observations from a planning workshop of an ongoing hospital construction. Our findings suggest that the challenges reported in the design of improvements to existing care facilities are also present in 'blank canvas' cases. However, in new-build cases more focus is placed on the physical spaces and layout, with patient experiences taking second place.

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2 RELATED WORK

Relevant related works are those exploring the application of co-design methods in the healthcare domain, particularly those that highlight limitations or problems.

Co-Design Methods in the Healthcare Domain

Sanders and Stappers[16] identified the value of including end-users and other stakeholders as a part of a design process, defining co-design as *"The creativity of designers and people not trained in design working together..."* and *"collective creativity as it is applied across the whole span of a design process"*. In the case of hospital design, the design process must address both the physical architecture and interior design of the wards and the intangible patient care processes. There is a large body of work examining the use of co-design methods, including patients, in the healthcare domain, particularly as part of an Experience Based Co-design (EBCD) methodology e.g. [1, 2, 4, 5, 7, 15]. The first application of EBCD in a cancer service in 2005, resulted in the identification and implementation of 62 improvements [1]. Donetto et al. [5] reported on the widespread use of the approach in healthcare services, noting that 59 EBCD projects had been implemented in the previous 10-year period. The benefits of the co-design-based approach in this context are generally noted as establishing positive working relationships between the stakeholders of patients, carers and designers [2].

Various co-design methods have been applied to hospital design, e.g., the cardboard hospital enabled prototyping patient-centric hospital spaces and services with stakeholders [10]. Compared to using realistic elements, the use of simplistic full-scale cardboard models produced more creative thinking, rather than being framed in the existing solutions. Others have used board games or mockup devices to guide data collection in health and wellness co-design cases [6, 9].

Domain Specific Challenges

It is important to also understand the limitations of co-design methods. Pirinen [12] identified limitations based on review of previous cases, e.g., when executed as a one-off activity, co-design can appear abstract, with little influence in the real world. Other potentially problematic areas concern the selection of participants for co-design workshops, with self-selecting patients resulting in bias and results that do not represent the patient population [3]. This is echoed by Canham et al. [4], who report difficulties in patient participants representing the views of the diverse patient population, with some individuals being tightly focused on only a single issue. Difficulties with roles are also discussed by Donetto [5], citing examples where healthcare workers are uncomfortable to move between the role of 'expert / decision maker' in their actual job, to that of a colleague to the patient in a co-design workshop. Bowen et al. [2] report on participant dissatisfaction with a co-design process including patient representatives in the hospital outpatients setting. Participants' were disappointed with the outcomes of the work, due to their unrealistic expectations about the level of change possible in a large organization in a short time. Additionally, the cost of the process, in terms of time people and money, was considered not to justify the benefits, resulting in difficulties in engaging staff in co-design events [4]. In a review of EBCD cases, Donetto et al. [5] report that organizational representatives feel that the process simply takes too long and costs too much and call for 'shortcuts' in the process.

3 METHOD

Informed by the prior research on the topic, we aimed to validate and extend the current state of discourse though the study of patient involvement in the design of two new hospitals. We carried out semi-structured interviews with three experts in two hospitals and, in one of the hospitals, observed a co-design workshop between hospital staff and hospital architects. The interviews and workshop took place in Finland during 2018. The interviews were transcribed and analyzed, and an affinity diagramming approach used to identify themes. The workshop observations were then mapped to the previously identified themes.

The interviewed experts had taken part in two new hospital builds, H1, which was finalized, and H2, the construction of which was still ongoing. The first interview was done on site at H1 with the project manager (P1), who was responsible for the construction process, budget and timing of the new build project. The second interview was done at H2 with two experts, the project manager responsible for the entire build process and timescale (P2), and the project coordinator who ensured information flow between the project and hospital staff, and, in some cases, to facilitated workshops(P3). We were interested to study if the pre-construction phase presents a point where changes may be more easily incorporated, particularly to understand how the patients' voice could be included at this phase. Our interview questions aimed to understand the big picture of a new hospital design process, what methods were used in which phases and how patients participated to the design and decision processes.

4 RESULTS

We firstly discuss the main findings from the expert interviews at H1 and H2 and then present the key issues identified from observing the weekly design planning workshop at H2.

Expert Interviews

Both hospitals used benchmarking at the beginning of the projects, with those leading the projects visiting and gaining knowledge of best practices from operational hospitals both

nationally and internationally. For both H1 and H2 benchmarking was seen as a very valuable and needed phase of the design. The design process for H2 began several years before the main planning phase. At this point a person was nominated whose job specifically included the study of service flows, e.g. defining processes to ensure the hospital's operation was effective and patient-centric. As a data collection method, workshops with existing hospital staff and patients, using co-design and service design methods were used. Both hospitals utilized a customer jury in their design processes. Each customer jury consisted of citizens, whose role was to represent the service users (i.e. patients) in the service development process. Views on the value of patient involvement in the design process differed between the two interviews. The project manager of H1 did not see much value in patient involvement, commenting, *"If we involve customers [patients] to the design process, there are always too many different opinions. Someone thinks it's awful and someone likes it and feels secured. Opinions are so different"* (P1). Nevertheless, H1 ran a few workshops with the customer jury, facilitated by a senior physician. The findings from the workshops didn't reach the project manager, and it is unclear how the data was utilized, if at all.

The interviewees in H2 considered patient involvement in the design phase as crucial. A virtual reality (VR) simulation of the new hospital, accessed through a head mounted display was created and evaluated in a workshop with stakeholders. The interviewees commented that this helped to concretize the redesigned spaces/rooms in the hospital. Firstly, hospital staff evaluated the use of essential apparatus and equipments in the VR simulation, giving feedback on how the room works in action. In a second phase, the customer jury were involved in the workshops. For example, the isolation room was tested with people who had real life experienced of it as patients, but also with those who had not. The interviewees considered this session as invaluable. P3 commenting, *"[Both patient groups gave] very valuable data, on what kind of room we need from the patients' point of viewâĂę The VR session also increased the communication between patients and nurses, when the patient could reflect his/her own experiences through the VR glasses. The information from the patients was very useful data, which helped hospital staff to better perceive patients' needs"* (P3).

In H1, a physical replica of the planned treatment room was constructed in the parking lot of hospital. The room was available for hospital staff, to visit and concretize and test different apparatus and equipment in context. The feedback from hospital staff was collected and utilized to modify the design when necessary. No patients, or customer jury visited the mock up treatment room. Even with the replica treatment room, the challenges of concretizing solutions were noted as a problem at all stages, *"When we aim to design something totally new in a hospital, the hospital staff haven't yet internalized it. First, they think 'let's do it like this'. Then they sleep on it and come in the morning saying 'No, actually it should be done like this'. The longer we go, the more changes they want, because things become more concrete. It affects all technical issues. If we have some fixed apparatus, we can't move it. That's one of the biggest challenges"*.

The potential to address the issues through service design was recognized, the H1 project manager noting *"It's extremely important to have a service designer, [to help with] efficient processes, and test the new service models through simulation, to enable being bolder with the ideas."* (P1), continuing *"but then the courage disappears when the staff begins to rebel against new service solutions"* (P1). During the interview in H2, time limitations and challenges to get a view to the overall care processes were highlighted, *"The schedule of the whole planning phase was so tight at the beginning, while creating different process descriptions, that there was not enough time to go through all the processes."* (P3). P2 continued, *"Nobody owns a patient's care process. Everyone optimizes their own expertise area, and this causes troubles when wards are not discussing between each other. No one owns the overall process."* (P2). Patients' are the main stakeholders in the caring process, and should be the start point for process design, yet they were not mentioned in the interview discussion. In H2 they plan to continue with the VR sessions, including the customer jury, through the build phase, noting, *"It is so easy and simple tool to concretize and increase discussion between stakeholders"* (P3).

Workshop Observation

Since the H2 project started they have been running two kinds of workshops weekly. The Monday, workshop gathered technical experts to discuss building related issues, e.g. heating, ventilation, and air conditioning. On Tuesdays, hospital staff from a specific ward was invited to discuss the requirements of the ward with an architect, based on their work and actions. The workshops each lasted around two hours. We were invited to observe a Tuesday workshop, focusing on the cardiology ward. The workshop was attended by an architect, four nurses and two doctors (N = 7) from the ward. As the usual facilitator was unable to attend, the architect facilitated the 2 hours workshop. The main topic of discussion was the floor plan of cardiology ward, e.g., the waiting and patient areas in the ward were discussed. Patients were not included in these workshops. However, at a few points during the discussion, the nurses related patient experiences that they have heard from patients during their work. One participant highlighted the importance of caring process design, *"In another hospital, I don't know if I have a patient waiting. Then I open my door and the patient is there lying on a stretcher"*. Although the architect listened carefully

to the discussions and agreed that the ideas raised need to be considered in the planning phase, there was little evidence of follow through. Discussions around patient experiences were very rare and when they did occur, shortly talked. Although it was clear that the primary aim was to understand the needs of the healthcare staff and address those in the floor plan, the patient experiences were not totally forgotten.

5 DISCUSSION

Whilst the potential benefits of utilizing patient-inclusive co-design in the healthcare environment are clear from the extensive prior work on the topic, e.g., [5], a variety of challenges have also been identified. Whilst the focus of prior research has targeted improvements to existing healthcare environments and services, our focus is towards new-build hospitals. Clearly this 'blank canvas' presents the potential for making substantial improvements to patient experiences, compared to contexts bound by old architecture, infrastructure and ways of working. However, such new-builds bring with them new stakeholders and demanding time schedules, compared with the situation in established care facilities.

Limited Timescales and Resources

The use of benchmarking, e.g. through visits to other hospitals remains perhaps one of the fastest and most cost-effective approaches for a new hospital to adopt general best practices for patient-centric care. In addition, both the hospital projects we evaluated had clearly recognised the potential of (patient) co-design methods and had utilised such approaches, although the perception of their value was mixed. Due to practical issues, such as schedule limitations, the institutions in our study considered patient-inclusive co-design as difficult to utilise. It was also recognised that co-design methods are not optimal for every issue or phase in the project. Whilst H1 made only minimal use of co-design methods in the planning phase, they acknowledged that investing more resources in this phase could have been beneficial, *"In hindsight there should have been more methods and more resources for the planning phase"* (P1). In comparison, H2, which had more resources allocated to the building planning project, had undertaken pre-work to investigate what methods would be beneficial in the planning phase, *"We did a lot pre-work and asked how other hospitals have done their construction projects. We basically copy-pasted the methods – and those have worked very well"* (P3).

Concretizing the Environment

Perhaps understandably, at the new-build phase, the main focus of the design processes was to the physical architecture and floor plans of the hospitals. A Virtual Reality (VR) simulation and physical mock-up of a treatment room were utilized in our studied cases to concretize the new spaces. These approaches were noted as supporting the development of physical solutions which can fulfil the needs of patients and healthcare staff. As noted in our interviews, there was a tendency for opinions to change when staff re-considered issues. Here, for example, involving patients with experience of the real-life service as part of a VR co-design session can add realism to the simulated environment. In this respect, rapidly modifiable simulations and mock-ups are essential to avoid costly mistakes.

Impact of Co-design Methods

Our interviews exposed similar challenges with the impact of co-design as highlighted in prior works [2, 4, 12]. In part we (and some of the participants) were left with the feeling that the co-design sessions in H1 and H2 were conducted just to be able to claim the process had been done. As identified by Canham et al. [4], participants over-estimating the potential scope and time scale for change is a main challenge with the method. In this respect the co-design workshop facilitator must find the balance between encouraging open creativity and being realistic with the participants on the scope of their influence. If the impact of the method is not apparent, then it is hard to justify the high investment in it. Novel approaches such as the cardboard hospital and gamification methods may be the way forward to increase buy-in to the methods [9, 10]. In addition, utilising other complementary Service Design methods in conjunction with patient co-design could provide a more cost-effective approach to the patient's voice.

6 CONCLUSION

New hospital design and build process are long-term processes, which are executed under high time schedule pressure, under the guidance of architects. In two new hospital build cases, we found that although there was general understanding of the benefits of patient-inclusive co-design methods, these were only minimally applied – largely due to time and resource limitations. At this phase of the hospital's life the main focus of co-design sessions (both with and without patients) focused to floor plan and equipment layout issues, enabled e.g. through Virtual Reality simulations and physical mock-ups. Involving patients in co-design sessions was considered by some to risk bringing diverse and non-representative opinions to the table. Although nursing staff often implicitly carry the patient's voice when providing input to design decisions, there is risk that understanding of the end-to-end patient experience is overlooked

REFERENCES

[1] Paul Bate and Glenn Robert. 2006. Experience-based design: from redesigning the system around the patient to co-designing services with the patient. *BMJ Quality & Safety* 15, 5 (2006), 307–310.

[2] Simon Bowen, Kerry McSeveny, Eleanor Lockley, Daniel Wolstenholme, Mark Cobb, and Andy Dearden. 2013. How was it for you? Experiences of participatory design in the UK health service. *CoDesign* 9, 4 (2013), 230–246.

[3] Hilary Boyd, Stephen McKernon, Bernie Mullin, and Andrew Old. 2012. Improving healthcare through the use of co-design. *The New Zealand Medical Journal* 125, 1357 (2012).

[4] Aneurin Canham, Gyuchan Thomas Jun, and Andrew Selby. 2016. Towards effective and efficient participatory systems approaches to healthcare work system design. © The 2016 Healthcare systems Ergonomics and Patient Safety Conference (HEPS).

[5] Sara Donetto, Paola Pierri, Vicki Tsianakas, and Glenn Robert. 2015. Experience-based co-design and healthcare improvement: realizing participatory design in the public sector. *The Design Journal* 18, 2 (2015), 227–248.

[6] Jonna Häkkilä, Mira Alhonsuo, Lasse Virtanen, Juho Rantakari, Ashley Colley, and Timo Koivumäki. 2016. Mydata approach for personal health–a service design case for young athletes. In *2016 49th Hawaii International Conference on System Sciences (HICSS)*. IEEE, 3493–3502.

[7] Richard Herriott. 2018. Patient involvement in Danish hospital design. *CoDesign* 14, 3 (2018), 203–217.

[8] Emelieke RCM Huisman, Ernesto Morales, Joost van Hoof, and HSM Kort. 2012. Healing environment: A review of the impact of physical environmental factors on users. *Building and environment* 58 (2012), 70–80.

[9] Juha Kronkvist, Marika Järvinen, and Teemu Leinonen. 2013. Games as Design Medium: Utilizing Game Boards for Design Enquiry with Cancer Patients. In *ServDes. 2012 Conference Proceedings Co-Creating Services; The 3rd Service Design and Service Innovation Conference; 8-10 February; Espoo; Finland*. Linköping University Electronic Press, 121–132.

[10] Juha Kronqvist, Heini Erving, and Teemu Leinonen. 2013. Cardboard hospital: Prototyping patient-centric environments and services. *Nordes* 1, 5 (2013).

[11] Emmanuel Kumah, Felix Osei-Kesse, and Cynthia Anaba. 2017. Understanding and using patient experience feedback to improve health care quality: systematic review and framework development. *Journal of Patient-Centered Research and Reviews* 4, 1 (2017), 24–31.

[12] Antti Pirinen. 2016. The barriers and enablers of co-design for services. *International Journal of Design* 10, 3 (2016), 27–42.

[13] James Rickert. 2014. Measuring Patient Satisfaction: A Bridge Between Patient And Physician Perceptions Of Care. https://www.healthaffairs.org/do/10.1377/hblog20140509.038951/full/

[14] Glenn Robert. 2013. Participatory action research: using experience-based co-design to improve the quality of healthcare services. *Understanding and Using Health Experiences–improving patient care* (2013).

[15] Glenn Robert, Jocelyn Cornwell, Louise Locock, Arnie Purushotham, Gordon Sturmey, and Melanie Gager. 2015. Patients and staff as codesigners of healthcare services. *Bmj* 350 (2015), g7714.

[16] Elizabeth B-N Sanders and Pieter Jan Stappers. 2008. Co-creation and the new landscapes of design. *Co-design* 4, 1 (2008), 5–18.

[17] Clare Villalba, Anjali Jaiprakash, Jared Donovan, Jonathan M Roberts, and Ross W Crawford. 2017. Making better use of recorded patient experiences: Transforming literature into a collaborative tool for inspired interaction. (2017).