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DESIGN SCIENCE FOR THE OPTIMIZATION OF PATIENT PATHWAYS AND DISCHARGE MANAGEMENT: A STUDY FROM A GYNAECOLOGICAL CLINIC IN SWITZERLAND.

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ABSTRACT

Hospitals are under pressure to improve overall quality and operate more economically. Against that background, this design research project aims at optimizing discharge management outcomes by means of improved patient pathways at a gynaecological clinic of a large hospital.

Referring to organizational science research that reveals a relevance gap for practice that could be met by prescriptive design research applied as a mode of organizational research, the project investigates how an understanding of patient journeys yield evidence by means of actionable knowledge, and how it be represented and integrated with that of the involved hospital professionals.

To that end, the research team conducted in-depth ethnographic research, resulting in various issues along the patient journey, including associated current and potential solutions and new solution ideas. A co-design workshop with hospital staff and patients revealed additional design propositions towards an optimized version of a patient process with regard to satisfaction and quality. The issues point to areas for optimization in the larger systemic context defined by the patient journey. The findings from the co-design workshop indicate that local staff can indeed be enabled to contribute to cross-disciplinary ideation activities.

The research contributes to an understanding of design-research-based evidence generation in the hospital context.

Keywords: Design research, patient pathways, evidence-based, design science, organizational science

1 INTRODUCTION

How can hospitals become more patient-centred? While under pressure to improve overall quality and operate more economically, new technologies, government regulations, demographic developments and changing patient expectations affect the healthcare system, the individual concept of health, business models of healthcare providers, and the design of healthcare services. One of the hotspots emerging as a result of these trajectories is the concept of patient-centeredness supported by means of design. An albeit young tradition in the convergence of design and healthcare can be observed particularly in the UK, United States, and Scandinavia, where hospitals and other actors in health care bring together design knowledge and organizational processes with regard to innovative problem-solving and increased patient orientation, and thus demonstrate the value of design knowledge in innovation-driven contexts as well

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as economic- and quality-driven application areas (Brennan et. al, 2009; Armbruster et. al, 2009; Bate, 2007a).

Drawing from these practices, the current project has been conducted in the context of a gynaecological clinic of a large cantonal hospital in Switzerland. The research team applied a design science research approach, conceptualizing design as a mode of organizational research in the context of a large organizational development project of the care department related to patient pathways and discharge management outcomes.

Only little research has been carried out so far at the intersection of organizational science and design science in healthcare (for an overview see Bate, 2007b), specifically in the context of hospitals and with an explicit focus on process design optimization. Two noteworthy projects at the international level concentrated on the exploration of aspects around process-related issues. One project at a National Health System Cancer Clinic in the UK focused on general patient-centred issues from an experience-based design perspective (Bate, 2007a), while a specific patient pathway-related project at Frederiksberg Hospital in Denmark focused on the implementation of a patient pathway (Scheuer, 2010).

The project's aim was to create evidence for optimizing patient pathways towards increased patient-orientation, ranging from the time period prior to clinic admission and stay until patient discharge and leaving the clinic. Based on an ethnographic approach based on contextual conversations with patients and staff, this report examines the contribution of design science research to patient pathway optimization. It demonstrates that design applied as a mode of organizational research can surface evidence based on an understanding of patients' experiences on their journeys through the hospital system. Furthermore, it shows that such a design approach can support an internal team in using that evidence, augmented by staffs' own experiences and knowledge, in a prescriptive way towards creating powerful ideas and concepts to be implemented as part of an optimized patient pathway. The findings are expected to support clinic staff in bringing forward more patient-centred solutions, and in increasing their awareness of the benefits for collaborating with patients and design teams in their optimizing and innovation efforts.

The report unfolds in five parts. The state of the art (section 2) addresses the connection between design science and organizational studies as a foundation for the use of the design approach in the health care system, with a focus on patient pathway process design. This is followed by a method section (section 3), presentation of the results from analysis (section 4) and a discussion of the research results in light of the research question (section 5). The report concludes (section 6) with implications for further research related to an understanding of patient journeys and co-design activities as means for creating evidence.

2 STATE OF THE ART OF DESIGN SCIENCE AND ORGANIZATIONAL RESEARCH

The concept and use of design as a mode of organizational research is informed by re-framing design from a practice-oriented service project to a research-oriented knowledge creation and integration project (Findeli, 2010) and by the relevance gap concept in organizational and management science (Romme, 2003; van Aken, 2004). This connection between design science and

organizational studies acts as a foundation for design research in health care. Current thinking suggests the potential for convergence relating to the production of complementary knowledge, with design research in healthcare bringing in the "knowledge related to general human ecology" (Findeli, 2010).

2.1 WEAKNESSES OF DESCRIPTIVE ORGANIZATIONAL STUDIES

Healthcare services and the associated processes are primarily viewed in the literature from an organizational perspective. Healthcare services are imposed on patients, and the models are oriented towards, for example, a Business Process Reengineering (BPR) perspective (Patwardhan & Patwardhan, 2006) or a supply chain model (Parnaby & Towill, 2006). These approaches derive from mainstream literature on how organizational processes are improved and also how the necessary instruments are further developed.

Such approaches originating from mainstream organizational studies are problematic for various reasons. Patwardhan & Patwardhan (2006) point out that BPR as a quality management instrument is not a general remedy in the healthcare sector. As a top-down planning and change approach with all the associated flaws such as "ownership loss" and "demotivation" (p. 292), a successful implementation linked with an increase in service quality is difficult, because BPR does not consider human aspects of processes in service contexts (p. 292). By the same token, Keen, Moore & West (2006), point out that supply chain models are inappropriate for the "design and performance of healthcare systems" (p. 316) due to the complexity of individual patient journeys. Patients navigate a healthcare system and co-produce care, while professionals coordinate their work. The healthcare process is for the patient in its totality experiential, while the individual practitioners see only portions of the entire process, and they seldom see the process results (p. 320). Patient journeys unfold via acute episodes along interfaces, with transitions between locations (such as home and hospital), between sectors (such as intensive care and social care), and between conditions of the individual (such as illness, healing, and self-management of chronic disabilities) (p. 312).

Romme (2003) and van Aken (2004) point out further important limitations of organizational and management theory. Romme argues that there is a so-called relevance gap; due to the focus on scientific evidence, findings are often not relevant for practitioners who act in a design mode. According to van Aken (2004) a weakness of those theory is however the lack of utility in providing relevant prescriptive management knowledge.

2.2 ADOPTING A PRESCRIPTIVE PATIENT-CENTRED CO-DESIGN PERSPECTIVE

Van Aken (2004) contends that prescription-driven research based on the paradigm of design science can reduce the relevance gap of management research (p. 219). In this sense, design acts as a mode of organizational research. Prescription-driven research should develop "field-tested and grounded technological rules to be used as design exemplars" (p. 221) for problem solving. Technological or design rules are, according to van Aken, general prescriptions for the solution of specific classes of problems (p. 228). Such rules should be used heuristically as a design exemplar that however must be translated into a specific exemplar variant for the solution to a specific problem (p. 227).

Following Romme's and van Aken's line of critique, Scheuer (2010) describes the link between design and patient pathways by means of a case study that studied what happens to the idea of patient pathways in the course of a collaborative implementation project. The case study illuminated how design science research generates prescriptive knowledge, in order to re-contextualize knowledge-based, de-contextualized evidence in local design work.

Design is forward-looking, according to Simon (1996), and deals with changing existing situations into preferred ones. In the words of Strauss, design is a particular kind of work that aims to make arrangements (cited by Scheuer 2010). Arrangements are agreements established between actors in organizations, in a negotiation process consisting of defining, interpreting and acting. These agreements relate to the work that must be done and depend upon the ability of the actors "to work things out" (Scheuer, 2010, p. 53). In this sense, hospital staff who work towards the improvement of patient pathways perform design work, understood as process design. In their design work on patient pathways they generate prescriptive design-oriented "actionable knowledge," with which they concretely implement scientifically grounded, general and descriptive knowledge of the positive impacts of optimal patient pathways ("technological rule"). This process is characterized by co-production, translation and bricolage (p. 57). *Co-production* means that the design process develops as a co-design process of actors, which is very different from a top-down-guided implementation process that implies and aims for a "technological rule." *Translation* means that the term "patient pathway" must be associated with a concrete time-and-place context with "human and non-human elements" (Scheuer, 2010, p. 57), in order to take on concrete meaning. *Bricolage* means that available persons and materials are used, and various interpretations of local contextual conditions and needs are considered.

2.3 CONCLUSION

According to Keen, Moore & West (2006), the evidence base for the design of healthcare systems is currently sparse, and more research and investment in the characterization and clarification of patient pathways and journeys through the system is desirable. The concept of patient pathway needs to be translated into a concrete process in a specific context (van Aken, 2004) where design science with its unique focus on empathy, users and processes can deliver substantial contributions (Keen, Moore & West, 2006). The design of a patient pathway is to be planned as a co-design process, combining planned and emerging elements. Qualitative and contextual case stories represent strong evidence to support a valid design proposition in a local usage context (Scheuer, 2010).

3 RESEARCH APPROACH AND METHODS

The *research goal* was to learn, through design science-based and methodical action, how a high evidence base for the process design optimization of patient pathways and discharge management outcomes can be generated. The *research questions* are related to role of patient journeys in research and to the co-design approach with clinical staff und patients: In what way can patient journeys and case stories as the outcomes of design science actions in a local design context produce a high evidence base for process design optimization of patient pathways and discharge management outcomes? This core question was split into two sub-questions. First: How do patient journeys create essential actionable knowledge in the form of concrete and process-relevant knowledge about patients with respect to the totality and complexity of their journeys?

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Second: How can the various perspectives of hospital staff be incorporated in a joint co-design process and be integrated in a shared conceptual model towards the goal of an optimized patient pathway?

Data collection and *analysis methods* were chosen and developed with the goals of two distinct, but interlinked research phases in mind that correspond with the research sub-questions. The research team aimed at crafting a contextual user research approach that included both patients and clinic staff in order to arrive at an understanding of as many of the different viewpoints as possible.

Related to the *Contextual user research* (phase 1), the unit of analysis was chosen to be the individual person. The sample consisted of seven pregnant women (patients) and 24 clinic staff members (among them nine doctors, six nurses, six midwives, three breast feeding consultants) and one external midwife of which most of them were on duty during child delivery of the seven patients. With three women being inpatient and four women being regular patients, both key patient groups could be included in the sample. Patients were chosen based on availability and personal motivation to be in service of the project. Staff members were informed about the project and agreed to participate. The small number of patients represented a qualitative sample that in retrospect turned out to represent a broad spectrum of individual experiences, and included also rather extreme ones.

Related to the *Co-design activities* (phase 2), the unit of analysis comprised all disciplines of clinic staff that were part of phase 1 (two midwifes, the chief physician, two nurses, a breast-feeding consultant, the external midwife and three patients), and the three-headed research team. This constellation of persons and expertise, especially the inclusion of former patients and an external midwife, was a novelty for the clinic.

3.1 DATA COLLECTION METHODS

In the *Contextual user research phase*, data collection was done by means of a design ethnography approach that included contextual conversations, patient diaries, and video messages. With each patient, two conversations were conducted, one at the home of the patient before her gynaecological hospital stay, the second again at home after her hospital stay where also the video message was recorded. For the time during hospital stay, patients were asked to make entries into a diary, provided in the format of a notebook that was supplemented with a calendar and an instruction and inspiration manual. The video message was later used as a ice breaker in order to kick-start and focus the conversations with staff. With each staff member, a contextual conversation at the clinic facility was conducted. Conversations were recorded and resulted in narratives from the individual patients' and professionals' point of views that were subsequently transcribed.

In the *Co-design activities phase*, data collection was done by means of a co-design workshop that was facilitated by the research team. The co-design process unfolded in three steps: In step 1, the research team provided an overview on the results from the contextual user research phase. In step 2 the research team tasked three cross-disciplinary working groups to ideate solution ideas and concepts for two issues per group. Each issue was presented by the working groups by means of a poster. Content was structured along a situation/problem description, a guiding „how might we …" question that addressed the issue, and a specific "what possible solution ideas could you think

of" question. Time was restricted to 30 minutes per issue. In step 3 the working groups presented their ideas and concepts in the form of diagrams or scenarios on paper. The workshop concluded by means of a facilitated dialogue about the participants' expectations towards implementation and an assessment of workshop format and constellation of participants.

3.2 ANALYSIS METHODS

In the *Contextual user research phase*, the analysis of the transcripts was done by means of a Grounded Theory approach (Strauss & Corbin, 1998). During the analysis process codes became issues, and were described in a descriptive manner.

In the *Co-design activities phase*, data analysis was done on the basis of the concept of the collaborative workshop format (environment, structure, duration), the facilitation approach, the employed methods and activities of the research team in relation to the constellation of participants and the results generated by them.

4 RESULTS OF THE FIELDWORK

The analysis of the *Contextual user research phase* resulted in 19 issues that uncovered and gave evidence of moments of irritation, troubles, anger, fear and frustration and also confidence, well-being, comfort and feelings of security that the patients encountered in the clinic from the moment of entry until discharge. Issues were subsequently documented and described along a structure of situation/problem description, associated quotes, findings, current and provisional solutions practiced by the clinic or by other clinics, solution ideas mentioned by staff, links to theories and concepts from literature, and relation to other issues.

In a second step, issues were visually mapped on a matrix structure that was defined by a horizontal axis representing the stages of the hospital stay (before, during, after) in line with an experience framework, and by an vertical axis representing the area of agency, i.e. hospital, the patient, and interaction between patient and staff members (fig. 1).

The issues can be classified in three groups:

— *Hospital-related*: communication of the service offering; entry into the hospital; cooperation of the professions; daily routines; spatial environment; social behaviour in a double bedroom; interculturality; leaving the hospital/discharge.
— *Interaction-related:* prenatal preparations; medical information; midwife model; situation-specific care; psychological care; follow-up care at home.
— Patient-related: awareness of competence; security and sense of security; ideal versus reality; self-determination; implicit and explicit fears.

These issues are „defining statements" that describe overall themes and – if applicable – sub-themes (example statement for the issue "leaving the hospital/discharge": „While discharging from the clinic, three out of six women in childbed experienced irritations due to organizational and medical reasons."). To be tackled in the co-design activities phase, these statements have been turned into guiding questions (example: „How might we design the discharge process so that patients can leave the clinic with a good feeling?").

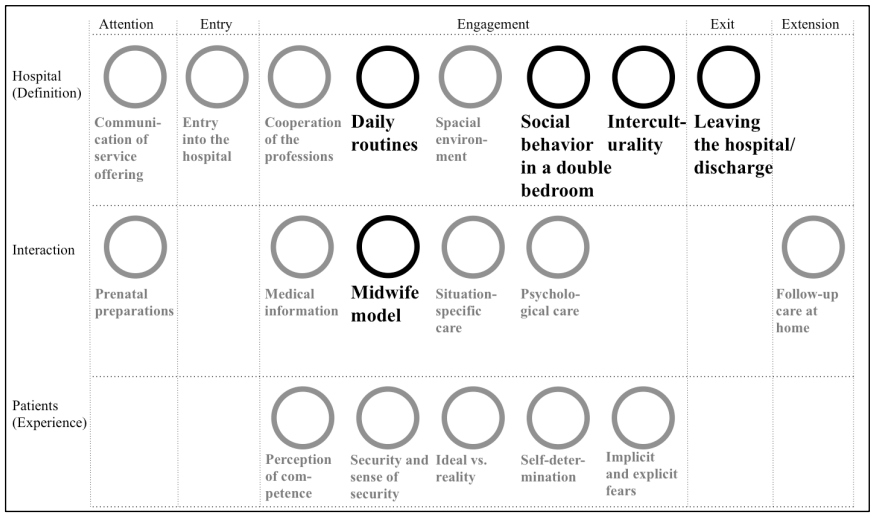

Figure 1 –Patient-centred care: Mapping of 19 Issues on a matrix structure (simplified version)

The results from the *Co-design activities phase* are solution ideas related to the five most relevant issues (leaving the hospital/discharge; daily routines; social behaviour in a double bedroom; interculturality; midwife model) and built upon ideas and concepts surfaced in the *contextual user research phase*. For the purpose of illustration, the conceptual idea for the issue „leaving the hospital/discharge" is presented here.

While leaving the hospital, patients experienced „irritations due to organizational and medical reasons". One quote of a patient captures this in the following words: *„Well, it was a little bit cold, mmh, as opposed to when we were welcomed at the clinic and everything was prepared and booked, and everything was explained to us, discharge and farewell were a little bit … yes … chaotic might be the right word."*

In the co-design workshop, the following conceptual idea for „leaving the hospital/ discharge" was developed: 1. Patient experience-facing: separate discharge (medical and psycho-social issues) and farewell (exit ritual, communicate transition from supportive environment to relying on oneself); conduct discharge in separate room, not patient room (avoid disturbance); discuss information related issues with partner (avoid stress for woman); consider giving small gift as token of clinic's appreciation. 2. Staff process-facing: define dedicated staff roles and plan distinct discharge related activities; train nurses and physicians for conducting discharge conversations (fig. 2).

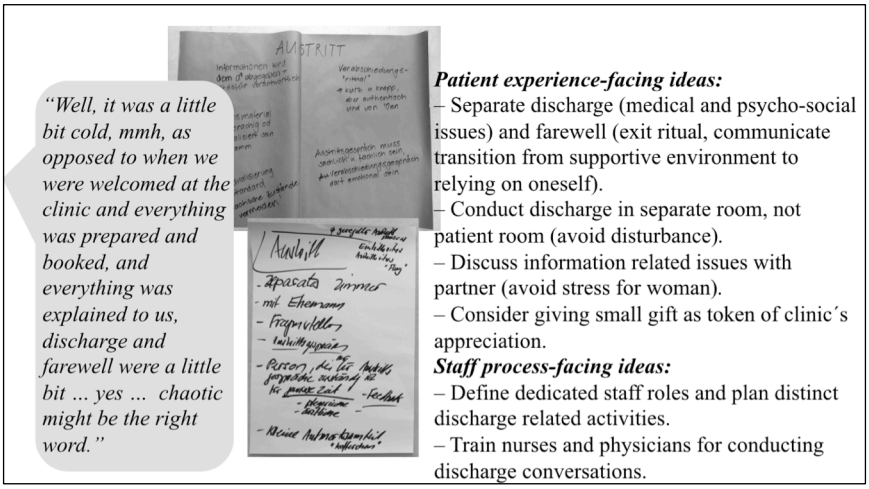

Figure 2 –Patient-centred care: from finding/supporting quote to conceptual idea (example for issue "leaving the hospital/discharge")

5 DISCUSSION

This design research study explored the capacity of design research in creating a high evidence base for design propositions aimed at optimizing patient experiences by means of an optimized process design of patient pathways in order to advance optimal residence time in the clinic as part of discharge management outcomes.

Scoping *Contextual user research* with pregnant women along individual time-based *patient journeys* surfaced issues that were mapped on and represented by means of an experience framework (attention, entry, engagement, exit, extension). By asking about cause–effect relationships, issues could be positioned close to the clinic context (cause/ definition), close to the patient context (effect/ experience), or in-between (staff-patient interaction). The discovered issues are pointing to a system of relationships between issues that culminate at interaction points between patients and staff.

Importing these issues into *Co-design activities* (a facilitated co-design workshop) enabled the extended team of clinic staff to generate meaningful solution ideas in a bricolage-like way by tinkering with issues, their knowledge and their experience in the context of the clinic.

These two results relate to the research question in the following way:

Related to *patient journeys*, the issues can be regarded as "concrete and process-relevant knowledge about patients with respect to the totality and complexity of their journeys as human beings along individual patient paths in the context of care-giving".

Even more, the "actionable knowledge" based on a *patient journey* view is enriched and balanced by knowledge gained from conversations with staff. The result demonstrates that a "characterization and clarification of patient pathways and journeys" (Keen, More and West, 2006) in the above sense yields valuable grounded evidence by means of prescriptive knowledge that otherwise might remain hidden or open to speculation.

How this prescriptive knowledge could be used towards an optimization of patient pathways will, however, depend on arguable positions based on specific clinic goals. Such positions would specify if that prescriptive knowledge would be used in terms of a constraint, an objective, or a directive.

Related to *case stories*, the co-design workshop demonstrated that "the various perspectives of hospital staff (can) be incorporated in a joint co-design process and be integrated in a shared conceptual model towards the goal of an optimized patient pathway."

The solution concepts generated in the co-design workshop demonstrate that design work of a local team of clinic staff, extended by patients and external staff, can generate valuable grounded evidence by means of solution ideas tailored to the local context that they know about in detail. While the overarching concept of patient-centeredness did not explicitly manifest during the whole project, the research team observed and heard that there is a mission among staff to serve the patients according to how these might expect their experience to be.

How these solution ideas could be integrated into ideal future short, mid or long-term scenarios for an optimized patient pathway, however, would have to be addressed in a follow-up project that is beyond the scope of this research.

6 CONCLUSION

Keen, Moore & West (2006) argue from a process perspective on modelling care processes that "the evidence base for the design of healthcare systems is currently sparse, and more research and investment in the characterization and clarification of journeys of patients through the system is desirable." They argue in favour of a network-like system model that they think could complement the standard supply chain model, and refer to Integrated Care Services within the NHS, where such models have proven to be successful (p. 318).

A gynaecological clinic is, however, different in that most of its patients are not there due to an illness or an accident and subsequent surgery or medical treatment that likely extends clinic and hospital boundaries, but most of them are healthy women who decide to rely on the clinic's state-of-the-art infrastructure for the purpose of giving birth. Therefore no specific model other than a linear, experience framework based view, forced itself on the research team.

Both patient journeys and case story yielded evidence and indicated a research area worthwhile to explore further in other types of clinics as well.

Concluding, it might be fair to say that this research project can be regarded as a valuable addition to a hopefully growing body of design science research projects that apply the notion of design as a mode of organizational research by leveraging both patient journey and case story towards the optimization of patient pathways in hospitals and healthcare.

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