BRIDGING OBSERVATIONAL RESEARCH AND DESIGN: VIGNETTES AS A STRUCTURED DATA SYNTHESIS METHOD

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ABSTRACT

Identifying design opportunities through a human-centred approach requires immersive contextual research—an essential process that can yield insights into stakeholder needs during the critical front-end phase of design. This paper presents a structured and rigorous framework for translating observational data into actionable design insights and opportunity spaces, a process relevant to both professional and student design researchers.

The research team conducted over one hundred hours of observational shadowing within the postnatal unit of a university teaching hospital. Four design researchers collected hand-written notes, which were subsequently transcribed, reviewed for accuracy, and synthesised into detailed vignettes. These vignettes were later coded and clustered into themes and subthemes, revealing a rich landscape of early-stage challenges and opportunities.

Developing vignettes is a method which offers several key benefits. First, it provides a credible, stakeholder-validated process for translating qualitative data into design insights. Second, the vignette format serves as an effective synthesis tool, facilitating interdisciplinary collaboration and ensuring that sensitive healthcare content is protected and accurately represented.

This methodology offers a way to bring greater rigor to early-phase design research practices, while also equipping the next generation of designers with versatile tools for transforming observations into impactful catalysts for innovation. This work underscores the value of user-centred design approaches, particularly within sensitive, high-stakes domains like healthcare.

Keywords: Observational research, vignette, human centred design, healthcare design

1 INTRODUCTION

This study was conducted as part of a four-year multiphase, mixed-methods project focused on generating insights to enhance maternal and postpartum healthcare systems. The United States ranks 24th out of 35 OECD (Organisation for Economic Co-operation and Development) countries for infant mortality and is the only high-income nation where maternal mortality rates are increasing, with non-Hispanic Black women experiencing rates 3 to 4 times higher than non-Hispanic White women [1], [2]. These disparities highlight an urgent need for a deeper understanding of the complex factors affecting maternal and postpartum health. This project aimed to address challenges in postpartum health through a human centred design approach. The use of modified design research methods facilitated collaboration with the clinical team, leading to innovative solutions that enhance safety and improve the experiences of both patients and providers. The research team consisted of designers, clinicians, researchers, and engineers from three leading research universities in the United States.

The research process began with in-depth observational studies conducted by four non-clinicians, including two senior industrial design faculty members and two master's-level industrial design students. The team completed 108 hours of shadowing in the postnatal unit. The design team aimed to gain a comprehensive understanding of the unit's operations, including communication channels, healthcare team workflows, staff routines, spatial organisation, and the flow of information and resources through contextual inquiry. This immersive approach provided valuable insights into the complex dynamics of the postnatal environment. However, translating such an extensive dataset into actionable design insights required a more structured approach than is typically necessary in design research. To overcome the common loss of contextual detail in data synthesis, particularly vital in the complex postnatal care

environment, the research team prioritised retaining the data in its nuanced context. To address this need, the team implemented a structured methodology centred on the creation of vignettes.
This approach ensured the systematic collection of relevant information, leveraging vignettes to preserve the richness of observational data, validate findings with the healthcare team, and transparently translate insights into opportunity spaces. This paper explores the design and implementation of an observational research study, focusing on the development and application of vignettes as a method for data synthesis and collaborative analysis.

1.1 Context & Rationale

Human-centred design (HCD) offers a valuable framework for developing novel healthcare solutions by prioritising the needs and context of end-users. Human centred design methods emphasise empathy, contextual understanding, ideation, and iterative development to address complex healthcare challenges that often lack straightforward solutions. However, as noted by Bazzano et al. [3], most design studies in healthcare do not provide accurate and thorough documentation of HCD methodologies. Design research, as a practice, frequently draws upon and adapts tools from social sciences, including psychology and anthropology [4]. The field has a history of creatively adapting and developing new data collection tools to address the specific needs of diverse user groups and environments [4]. Among these foundational tools, observation (contextual inquiry) and artifact analysis stand out as particularly relevant to this research study and constitute the backbone for the development of this collaborative methodology.
This study's approach is driven by overarching goals of transparency, traceability, and cultivating a deep understanding of diverse perspectives within a complex healthcare system. The sensitive nature of healthcare environments has historically limited access for non-clinical design researchers. In the past, designers collaborating in healthcare typically focused on distinct physical artifacts [5]. As awareness of design's role in addressing broader healthcare challenges has grown [5], establishing appropriate methods for engaging with larger systems and services has become increasingly important. Therefore, to achieve the goals of this research, the team adopted the use of vignettes, a tool commonly used in social science research.
In social sciences, vignettes are short scenarios or narratives depicting individuals in specific situations, intended to elicit responses or explore perceptions, beliefs, and attitudes [6]. Typically, they use fictional characters as a means of prompting participants to speculate on what those characters might do next, encouraging reflection on social norms and behaviours [7]. When used in interviews, these fictional scenarios provoke reactions, offering insights into participants' attitudes and reasoning. Real-life vignettes have also been employed to obtain rich, detailed accounts more efficiently than traditional semi-structured interviews, especially when spatial and temporal constraints limit the research context [8]. In these cases, participants respond to realistic scenarios, which allow researchers to explore sensitive topics in a non-threatening way [6].
Vignettes in social sciences enable researchers to be flexible in how they present complex environments and provide the opportunity to highlight variables related to the topic [9]. The field of design research, particularly for software user experience design, also has precedents of narrative tools called user stories and scenarios [10], [11]. These tools allow design teams, often comprised of contributors representing different disciplines, to align around a common understanding to drive the development of products with user empathy at every step of the process [10], [12]. Although these methods are commonly applied in software development, this study illustrates their applicability in capturing and analysing contextual data within a dynamic healthcare setting.
The observation vignettes in this study serve as synthesis tools. Unlike traditional social science vignettes, which may utilise intentional ambiguity to elicit participant responses, these vignettes contextualise observations which objectively present complex events, procedures, and participant interactions. This research format facilitates the documentation of designer insights and opportunities, allowing both the collection of and distinction between observed data and subjective interpretation.

2 METHODOLOGIES

The design researchers, in collaboration with clinical partners, strategically selected roles to shadow to ensure representation of key stakeholders and capture the full spectrum of interactions within the postnatal unit. These roles included nurses (n=6), charge nurses (n=4), paediatricians (n=2), nursery nurses (n=2), a lactation nurse (n=1), a certified nurse midwife (n=1), a family medicine physician (n=1),

a hospital unit coordinator (n=1), and a certified surgical technologist (n=1). Shadowing was conducted in half shifts (4-hour blocks) across mornings, afternoons, and evenings, to capture the various changes in workflow throughout the day. Observations were conducted over a four-week period. Two researchers simultaneously shadowed different practitioners during the same shift, occasionally allowing for the capture of multiple perspectives on the same events.

The research team developed initial observational data worksheets to guide consistent data collection, drawing inspiration from frameworks such as the Activities, Environments, Interactions, Objects, and Users (AEIOU) framework [13]. These worksheets were iteratively refined based on insights gained during a pilot phase of data collection. The observation sheet recorded details such as date, time, researcher, shadowed role, location, task, and communication methods, including interactions between healthcare team members and patient-healthcare team communications. These communications occurred one-on-one, through electronic health record systems, or via a wireless communication platform using wearable devices (Figure 1a). A patient form captured contextual information on room setup, mother-infant pair details, race, ethnicity, age, delivery type, and patient acuity (Figure 1b). Additionally, a debrief form which included key takeaways and opportunities for improvement documented immediate impressions at the end of each observational instance.

The resulting detailed observational data was initially documented in a spreadsheet, with personal impressions and questions documented in separate columns. After proofreading and validating the spreadsheet with healthcare team members, the design researchers recognised that its size and complexity limited its usability for in-depth analysis. To address this, the team developed observation vignettes as a structured format for synthesising and presenting the rich observational data, including details such as the date, the person shadowed, patient interactions, and key events. These vignettes were structured as short narrative accounts, each focusing on a specific observational event and incorporating the detailed information captured during the shadowing process.

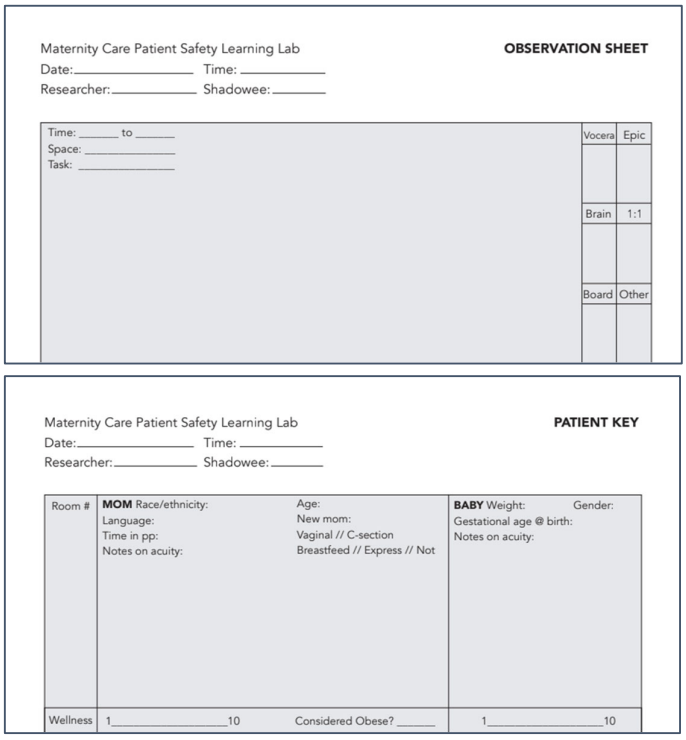

Figure 1a.Sample of data collection sheet format with a focus on capturing data flow
1b. Sample of patient data collection sheet with a focus on demographic information

2.1 Vignette components

Each vignette (Figure 2) represented one shadowing event and was organised into the following categories:

1. **Context and People:** This section provided a brief description of the person being shadowed, as well as demographic details about the birthing parent and baby dyad. It included information from

Electronic Health Records (EHR), such as the birthing parent's age, type of delivery, preferred language, number of previous births, and the baby's gestational age, gender, weight, and other relevant details.

2. **Observation Highlights:** This section included the researchers' observational notes as they followed each participant. These notes detailed interactions between the person being shadowed and their patients, other healthcare team members, family members, and hospital staff. Additionally, it included observations about spaces, environments, tools, forms, and technology used by the team members.
3. **Challenges and Opportunities:** This category reflected the design researchers' perspectives on the challenges and opportunities observed during the shadowing event.
4. **Shadowed Person's Insights:** In this section, the person being shadowed shared their perspective on problems, insights, or ideas they had for addressing challenges.
5. **Relevant Images:** The vignettes included images illustrating specific challenges or opportunities, mostly related to spaces, work areas, furniture, tools, and both digital and analogue systems. These images were taken during the shadowing events, with permission of the staff.

The design research team clustered similar content from the vignettes and labelled emerging themes, identifying patterns in the data. Using thematic analysis, researchers examined the clustered data to uncover recurring themes within and across the vignettes. Codes representing recurring actions, communications, and environmental factors were generated inductively based on these patterns. Themes were refined through iterative discussions among the researchers and their relevance and accuracy were validated with healthcare team members, ensuring that the analysis moved beyond surface-level observations to identify underlying issues.

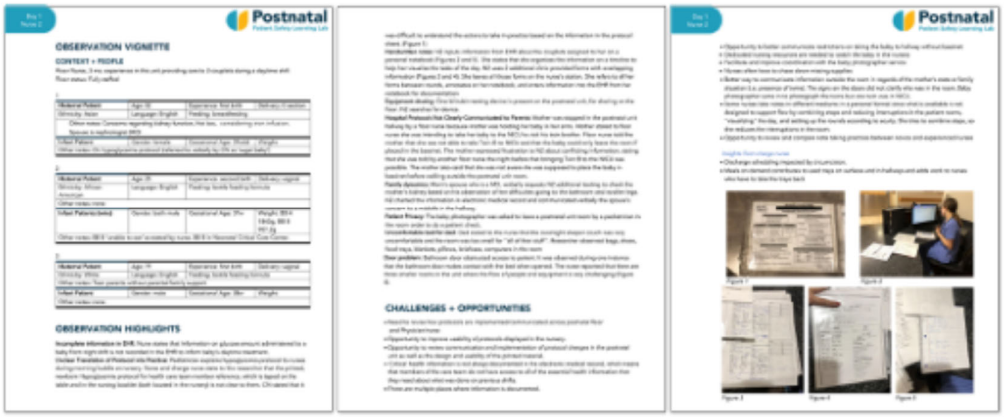

Figure 2. Example of finalised vignette

3 RESULTS & DISCUSSION

The study resulted in the creation of eighteen unique vignettes which created an understanding of the complexities, challenges and opportunities present in the postnatal unit of a hospital. The resulting codes generated from the vignette thematic analysis and coding were organised into two main segments with associated subtopics:

1. **Postnatal Unit Information** (between health care team and parent/family)
    a. Patient Education: Information the mom and family need to successfully transition home.
    b. Postnatal Unit Information: Postnatal unit details that the mom and family should know.
    c. Personal Experiences: Factors influencing the parent and family's overall experience.
    d. Parent/Family and Healthcare Team Communication: Information exchange between the mom/family and the healthcare team.
2. **Healthcare Team Communication** (between health care team members)
    a. Postnatal Unit Teamwork: The ways in which the postnatal team collaborates with each other and others in the hospital.
    b. Shared Understanding: Shared practices, understandings, information, and workflows among the healthcare team.

Further elaboration on these thematic areas, including details of analysis and results, is available in accompanying publications. The volume and complexity of observational data collected in the postnatal unit presented a significant challenge for analysis. The vignette methodology provided a practical solution for managing this complexity while preserving the contextual richness essential for in-depth analysis. By condensing detailed observations into structured narrative accounts, the method facilitated a more systematic and collaborative analysis.

This approach allowed the research team to move beyond surface-level observations and identify underlying patterns and themes, leading to a more nuanced understanding of the postnatal care environment. A key differentiator of this method, compared to traditional ethnographic approaches, is the implementation of iterative team check-ins, which proved essential for both data accuracy and team collaboration. These check-ins were particularly critical for non-clinical designers, who frequently encountered ambiguities in interpreting clinical processes and information streams. By engaging healthcare professionals in the validation process, the research team ensured reliability of the observations, mitigating potential misinterpretations and fostering a deeper understanding of the clinical context. This process of iterative validation resulted in more contextually rich datasets than if the design team had attempted to interpret it alone. The potential for observer effects is a recognised limitation in observational research. While prolonged engagement aimed to build rapport, future studies could further mitigate bias through triangulation with other data sources, such as staff interviews and quantitative metrics. It is worth noting that observations took place in a teaching hospital, where both patients and healthcare team members are accustomed to the presence of students and researchers, potentially reducing the impact of observation on behaviour. A strength of the vignette methodology is its ability to establish a common ground for interpretation of data between non-clinical designers and healthcare professionals. The co-designed vignettes served as a crucial tool for translating complex clinical observations into a format accessible to all team members. By structuring the data into narrative snapshots, the vignettes facilitated a shared understanding of the postnatal unit's dynamics, integrating the diverse perspectives of designers, clinicians, researchers and engineers. This collective language and format proved crucial in aligning the team around common goals and fostering a sense of shared ownership over the design process, a key goal of problem-solving in cross functional teams [14], [15]. The finalised vignettes served as a foundational platform for integrating diverse disciplinary perspectives and subsequent design activities, including coding, mapping, and workshops focused on problem definition and 'how might we' ideation. The vignettes also aided in the identification of barriers and facilitators within the postnatal unit.

3.1 Implications for Design Education

The structured and collaborative nature of this vignette methodology offers valuable insights and practical applications for design education, providing a framework for cultivating essential research and analytical skills in future designers. The detailed, context-rich narratives within the vignettes can serve as valuable contextual prompts for design students when exploring and understanding user personas. Rather than relying on generalised assumptions, students can use the specific behaviours, interactions, and challenges documented in the vignettes to inform their understanding of potential users within a given environment, such as the postnatal unit.

Focused Observation and Structured Documentation: The process of creating detailed vignettes requires students to develop observational skills and learn to document complex information in a clear, organised, and narrative format, crucial for effective data capture and management in design research.

Collaborative Interpretation and Empathy Development: Analysing and validating vignettes in a team setting fosters collaborative interpretation of findings and encourages students to develop a deeper understanding and empathy for the users' experiences and perspectives. This practice further provides an opportunity for students to examine and resolve perceived discrepancies in collected data.

Format and Synthesis for Communication: The vignette format itself provides a powerful tool for students to synthesise complex data and communicate their research findings in an accessible and engaging manner, a vital skill for presenting design insights and recommendations.

4 CONCLUSIONS

The vignette format provided a standardised framework for organising and analysing complex information. Use of vignettes for synthesis facilitated the identification of patterns and themes, ultimately enabling the development of a comprehensive understanding of both processes and

information streams in the postnatal unit. It ensured traceability, amplified the voices of the multidisciplinary team and grounded interventions in the observed needs of healthcare team providers, patients and families. This methodology also ensured ethical rigor by maintaining participant confidentiality while preserving critical details relevant to the observed events.

By applying vignettes to organise and analyse observational data, this study contributes valuable methodological approaches for design in healthcare research. Additionally, vignettes can serve as a valuable pedagogical tool for design students, offering a structured framework for synthesising complex observational data and developing evidence-based design solutions. Students can practice key skills, such as contextual inquiry, collaborative analysis, and the communication of design insights through vignettes. Future research could explore this method's applicability in other complex healthcare settings and explore the long-term impacts of design solutions developed using this approach. While this study focused on a single postnatal unit, the principles of structured vignette creation, collaborative validation, and thematic analysis offer a transferable framework for analysing complex observational data in other healthcare settings and potentially in diverse fields beyond healthcare.

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