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Wait and transfer, curate and prosume: Women's social experiences of birth spaces architecture

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ABSTRACT

Background: The birth environment can help or hinder physiological birth and influence a woman's level of satisfaction with birth.

Aim: This paper gives new theoretical insights into how spatial architecture influences birthing women and their birth processes. It builds the architectural awareness of midwives/ designers need by linking design regulations/recommendations and experiential aspects of birth spaces architecture.

Methods: Two qualitative methods were used: (1) a regulation/policy document critique, and (2) childbearing women's spatial experiences explored in semi-structured interviews with drawing methods (24 mothers in a case study location in the north of England, UK). Themes emerged from semiotic (documents/visual data) and thematic (transcripts) analysis, and their relationships explored.

Findings: The regulatory documents revealed four spatial categorization concepts: (1) medical risk; (2) a tripartite clinical approach; (3) single-function birth space; and (4) a woman-centered approach. In contrast, women experience birth spaces architecture as an amalgam of all the spaces they use and in affective, interpersonal. Two patterns of spatial use emerged from the interviews: (1) 'wait and transfer' (more common in healthcare buildings); and (2) 'curate and prosume' (more common in women's homes). Women gave greater positive descriptions of the 'curate and prosume' pattern.

Conclusions: The influence of building regulations on hospital settings and women's prior experiences of such spaces through appointments and antenatal education, shape women's spatial experiences of childbirth. This new evidence can act as a catalyst to evolve birth space design towards delivering woman-centered and personalized care in spaces designed for women to 'curate and prosume'.

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Statement of significance

Problem or issue

Our knowledge of women's spatial experiences of childbirth is limited. An architectural-social theory which could create buildings which support woman-centered care, is lacking from the types of regulatory and policy documents used to design birth spaces.

What is already known

Birth environment research has emerged from existing evidence-based healthcare architecture and midwifery practice, resulting in evidence which emphasizes the concerns of these two disciplines. Current knowledge tends to favor environmental science or midwifery-practice based knowledge and not use architectural theoretical ideas that could support more woman-centered environments.

What this paper adds

Knowledge of how women experience birth spaces across their whole labor journeys and the impact of regulatory design guidance on women's birth experiences. It highlights the transformative power of applying a social-spatial approach to architectural space designed for childbirth and calls for greater interdisciplinary research collaboration and research agendas focused on how birth spaces architecture is experienced.

1. Introduction

Healthcare architecture is a specialized form of architecture with additional regulation to that of other buildings, leading to highly-regulated and standardized maternity care settings within hospitals [1]. Architecture is often separated into a production phase and a consumption phase which current practices of procurement, design, and building management separate out with

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little interaction between the two phases. What does not influence the production phase as well as it should is people's experiences of such spaces. Post-occupancy evaluation is not common within architectural practice. The investigation of how people feel, interpret and experience spaces with their bodies, and the memories they take away from being in spaces happens in less than 7% of buildings constructed in the UK [2]. Post-occupancy evaluation has been identified as a means of delivering architecture which better supports the needs of building users [3]. Nevertheless, the embodied experiences of building users are often influenced, unconsciously, by all the ideas that went into the production of such spaces [4]. Ideas such as building design regulations, maternity policy, finances, medical risk, scientific testing of the environment and the aesthetics of what we expect a clinical environment to look like (white, crisp, clean or even homely) all influence the production phase of maternity care settings.

Building regulation guidance is universally applied in UK design practice and is especially stringent for healthcare buildings. Osman argues that since this form of building regulation emerged in the Twentieth Century it reveals 'Modernism's visible hand' [5] behind its intentions. Modernist thinking in architectural design largely rejected social-cultural aspects of buildings in favor of new building forms which symbolize new scientific approaches. Within building regulation there is a residual legacy of guiding designers to use 'intersections of management with technology' [5] and value a scientific approach to construction. By virtue of locating maternity services within healthcare buildings built during a past, more Modernist design approach, when a pregnant or laboring woman accesses these services, she engages, consciously or unconsciously, with spaces which define childbirth through 'medical norms' [6] so that it is 'no longer a purely social or personal event, nor is it the specific province of women' [6]. Despite more recent changes in design approaches, a "normal" hospital childbirth experience exposes women to many healthcare design concepts, for example a crisp, clean aesthetic of hygiene, standardized spaces not adapted to her needs, layouts designed for effective use of equipment and staff time, and the application of technology-based solutions for delivering healthcare to a large, diverse population [7].

Birth-environment research is a burgeoning and exciting field with great potential to support midwifery practice goals, but one which has not established its own protocols, definitions, and systems of working. Primarily, such research is situated within the context of midwives and obstetricians' professional concerns, supported by a diverse group of design professionals. Birth environment design largely emerged from architect Lepori's work [8,9] which was theoretically architectural and woman-centered. Her work has not provoked significant interest in understanding these spaces as having different needs to other hospital spaces within the working world of healthcare architects [9]. Firstly, there is a reliance on day-to-day experiences of professionals (healthcare architects, estates managers, obstetricians and midwives), for example: Plough et al.'s use of an interdisciplinary professional advisory board [10]. Secondly, midwifery clinical research studies often rely on single factor room modifications, for example: Hauck et al.'s study of placing room interventions into a labor ward room to create a relaxing Snoezelen environment [11]. Thirdly, many studies relate how a birth room impacts on midwifery practices rather than seeking direct understanding of women's experiences, such as Malesela's study of midwives' perceptions [12]. Finally, there is a reliance on using healthcare architecture studies to inform thinking for example, Foureur et al.'s hypothetical model linking birth unit design and safe, satisfying birth [13].

What these approaches lack is a strong, consistent building user-centric approach informed by the people who give birth in

maternity facilities. This means that birth spaces architecture is currently understood through many filters of professional practice and priorities. Taking the earlier examples in turn, firstly there is a tendency for professional members' interests to dominate over patient interests in NHS client teams for construction projects and their judgement of building users' needs is poor [14]. Secondly, single factor room modifications rely on a Modernist architecture principle that 'form follows function' which is also a common understanding in healthcare architecture [7]. This leads to a research focus on the birth rooms on labor wards and how these might impact on women's childbirth experiences, since these are the only rooms with this express function. Modifying equipment and decoration is a common practice within midwifery in order to improve the quality of the birth environment [15].

Thirdly, childbearing women are not involved at all stages of designing and completing research [16] and in some cases have the role of validating research findings after they have been completed [17]. A final challenge within these approaches is an acceptance of healthcare architecture research without a critique of the selected evidence bases which lie behind this approach to architecture. The approach that healthcare architects take to designing healthcare spaces is one that seeks to standardize elements for financial and material efficiency in order to deliver medical safety through strong regulation of such spaces [18]. The evolution of healthcare architecture is documented as a rejection of social or personal experiences of spaces as subjective [19], the adoption of medical, scientific and environmental science strategies to inform design methods [1] and focused on optimizing medical outcomes [20].

These underlying evidence bases, largely selected from medicine contrast with woman-centered or person-centered philosophies occurring within many disciplines that are touched by healthcare architecture, and indeed with healthcare architects who do seek a user-centric understanding of spaces. The UK's ongoing NHS maternity transformation programme resulting from the *Better Births* policy document [21], encourages NHS Trusts to co-produce maternity services with parents and deliver woman-centered, personalized care. There is also a call within medical sociology texts for a user-centered, experiential approach to understanding healthcare architecture [22]. Within architecture as a broader discipline, recent theoretical discussions re-frame architecture as how people imagine, experience and interact with manmade spaces [23]. This is architecture conceived as a sociological phenomenon that shapes our evolving behaviors and opinions as much as it is an expression of prevailing attitudes to the way we do things [24] such as "do health" in the case of maternity facilities.

Walsh and Evans [25] note that it is problematic when midwifery research is led by concerns of medical safety and clinical birth outcomes because this does not help midwives to understand the complex physiological, psychological and social factors that make up a safe, satisfying birth for a woman. In line with prevalent shifts towards maternity practices which value women's holistic experiences of labor and giving birth, I explore childbearing women's experiences within birth spaces as a starting point for new design tools for such spaces. This is a radical move within the context of accepted healthcare architecture practices since it does not lead to results which easily standardize or deliver measurable outcomes. Instead, I showcase the idea that birth spaces architecture exists beyond the birth room and is something personally connected to each individual woman, for each birth she has, and remains with her in her memories. Soja describes this stance as understanding architecture as 'simultaneously real and imagined "other spaces" . . . in which our individual biographies are played out, in which social relations develop and change, in which history is made [26].

There is little precedent within birth environment research for examining policy-related design guidance and the spatial experiences of women during childbirth or combining these together in one study. In this paper, I concentrate on the nature of policy-related design guidance used in the production of birth spaces and its relationship with childbearing women's experiences of birth spaces, with the intention of demonstrating that women's experiences are influenced by this guidance and that what designers have available to them poorly reflects the aims of UK maternity policy. I intend to show that analyzing birth spaces architecture through the means within which it is produced and understanding how it is experienced, is a starting point for thinking differently about this unique form of architectural space. I write in the first person to express that, as qualitative research, my researcher reflexivity and positionality influenced the study design [27]. My position is not framed by midwifery training or practice, rather by professional expertise in architecture, childbirth education and women's support as a UK NHS service user representative.

2. Methodology

I conducted a qualitative study examining policy documents as semiotic materials whose ideas influence the production of maternity facilities and analyzing women's interview data and drawings to provide much needed evidence for a women-centered approach to birth spaces architecture. I selected a qualitative approach as a counterstrategy to the reliance on quantitative research in healthcare architecture and to elicit the richness of lived experiences. I focused on the capacity of visual methods for eliciting spatial experiences in comprehensive, holistic ways including via senses, perception and memory [28].

2.1. Data collection

I identified three exemplar peer-reviewed policy design guidance documents (Table 1) through a purposively sampled literature review. These are cited extensively in UK, international and interdisciplinary peer-reviewed publications (published up until summer 2016). I selected documents through academic search engines (e.g. Google Scholar), university library collections and NHS England online document repositories, including a UK Department of Health Freedom of Information request.

2.2. Qualitative interviews with visual methods

I selected a case study location of two NHS Trusts in the north of England which offer women the full range of birth venues identified as desirable in *Better Births* (2016) policy and described in Table 2. Site One had consultant-led maternity units (n = 2) and

NHS home birth services (n = 1), plus the services of independent midwives. Site Two had consultant-led maternity unit (n = 1), midwifery-led maternity unit or "birth center" (n = 1), alongside a consultant-led unit, NHS home birth services (n = 1) plus the services of independent midwives.

Women self-selected to take part in interviews and were included if they had given birth within the last 12 months in the case study location. I managed recruitment to elicit a diverse range of birth experiences, all of which included an experience of labor. Only planned caesarean births were excluded, otherwise straightforward, water, assisted and caesarean births and induced labor were represented in the sample. Those under the age of 18, those known to be vulnerable or women requiring an interpreter for the interview were also excluded.

Between April and July 2015, twenty-four women took part in semi-structured interviews targeted at investigating spatial experiences via drawing spaces used for labor and/or birth. Drawing methods facilitate difficult to verbalize experiences [35], are a core architectural representation method [36], and steer research participants to think spatially [37]. The interview started with the request: can you draw what you remember of the space where your baby was born? Participants used pens and flipchart paper to draw all the spaces they remembered as important to them. They were encouraged to draw rooms in the time-order they preferred after starting with the birth. After a period of drawing, I offered the participant a series of adhesive stickers which they could add to their drawing. By selecting and placing stickers on their drawings, participants recalled further data on emotions and physical positions associated with the spaces drawn.

2.3. Participant recruitment and ethics

Participants mainly responded to advertising on social media, then through snowballing. Some were recruited in NHS postnatal clinics, where midwives introduced the project first, and visits to local parent and toddler groups. Purposive sampling ensured an even representation of birth venues:

- Four women gave birth in *consultant-led unit one*,
- Six gave birth in *consultant-led unit two*,
- Five women in *consultant-led unit three*,
- Three women in the *alongside birth center*,
- Six women gave birth in *six homes*.

I assigned flower names pseudonyms to maintain anonymity and all participants signed a consent form approved by the NHS Trusts involved. The study received a 'favorable ethical opinion' from The Proportionate Review Sub-committee of the NRES Committee South Central - Oxford C on 12 November 2014.

Table 1
The three regulatory policy documents.

Document	Description	Found in
<i>Better Births: Improving outcomes for maternity services in England</i> , 2016 [21]	A forward plan derived from a 2015 National Maternity Review of English maternity services.	Multiple UK midwifery research studies which examine organizational strategies for continuity of carer, personalization of women's care and improvements to postnatal care.
<i>Health Building Note 09-02: Maternity care facilities (HBN09-02)</i> , 2013 [29]	Covers the design and planning best practices for UK maternity facilities.	Department of Health/NHS England capital funding calls for bids [30,31]. NHS internal documents which request compliance with this guidance in architectural design projects for UK maternity facilities.
<i>The NCT Better Birth Environment Audit Toolkit (NCT BBE)</i> , 2003 [32]	Developed from Newburn & Singh's research [33] on women's views of what environmental factors help or hinder labor and is a resource for auditing the birth environment.	Cited in HBN09-02 and many studies that have influenced maternity unit designs [9,11,13,34].

Table 2
Descriptions of UK birth venues.

Venue	Description
Consultant-led unit (CLU) within a hospital.	<ul style="list-style-type: none"> • Most common UK type with consultant-led care team. • Large-size building (catering for around 5-8000 births per year). • Co-located specialized suites of rooms: delivery suite, dedicated operating theatres, special care baby unit, antenatal and postnatal wards.
Midwife-led Unit (MLU) or Birth center (ABC or SBC)	<ul style="list-style-type: none"> • Midwife-led care team. • Physically and organizationally small (catering for 50–2000 births per year). • Access to anesthetic pain management, dedicated operating theatres, special care baby unit, antenatal and postnatal wards only through transfer to a consultant-led unit. • 'Alongside' a CLU (ABC) or 'standalone' (SBC) in a more distant location.
Home	<ul style="list-style-type: none"> • Midwife-led care team usually dedicated to home birth. • Birth may only take place once or twice in a woman's home. • If a woman transfers from home to a CLU this is by ambulance.



Fig. 1. The concept map I drew for Jasmine.

2.4. Analysis

Regulatory documents and drawn interview data were analyzed as ‘semiotic materials’ [38] which express spatial, cultural, design, professional and/or personal meaning through genre, style and content [38]. I applied recommended approaches for analyzing document genre: font choice, salience and layout [39]. I considered content structure, rhetorical structure, layout, rhetoric, navigational and linguistic structure [40] to detect nuanced messages within the text and visuals, and how they relate to each other. The drawings were visually simpler objects, but similarly analyzed to detect nuances in drawing method, representation of people, furniture, and equipment. Interview transcripts were thematically analyzed, noting meanings transmitted through their reciprocal relationship with women’s drawings, and any similarities and contrasts with document data.

Nvivo software aided initial thematic coding, then each woman’s interview data was synthesized/reduced (Fig. 1) through ‘concept maps’ [41]. Interdisciplinary thematic analysis continued, paying attention to data multi-modality and in discussion with midwifery and architectural doctoral supervisors. The analysis was interdisciplinary in that it was located outside of one discipline and took an affective, interpersonal experiential understanding of architecture. As an architect, I applied my architectural knowledge to women’s experiences of maternity care and vice versa, as an antenatal teacher, I applied my knowledge of maternity care to women’s descriptions of spaces. The reported findings offer insights into concepts which shape birth spaces production and ones which shape women’s experiences of such spaces, and support midwives and designers in thinking differently about birth spaces architecture.

3. Findings

3.1. Introduction

Firstly, I present four spatial categorization concepts from the policy design guidance document analysis which influence the production of birth spaces; secondly, I describe the nature of women’s experiences; and finally, report two distinct patterns of spatial use, and related labor behaviors and experiences, which emerged as significant themes in the interviews.

3.2. Production of birth spaces from the document analysis

Four spatial categorization concepts for the production of birth spaces were identified in the UK Health Building Note 09-02 for maternity facilities and these were compared to care and design

strategies in the *Better Births* policy document and the *NCT Better Birth Environment Audit Toolkit*:

3.2.1. Medical risk

The primary spatial categorization concept is for medical risk categories to define the form and function of spaces and equipment in maternity facilities – as either high or low (Fig. 2). These risk categories relate to which clinical specialism provides care and this design strategy groups together rooms according to staff expertise (consultant-led rooms grouped together and similarly, midwife-led rooms). This first concept contradicts *Better Births* maternity policy which proposes for care to be organized across professional boundaries with the woman and her family at the center of this organizational structure (‘Principle 3. Safer Care’).

3.2.2. Tripartite clinical approach

The second spatial categorization concept is to separate pregnancy, labor, and birth into three distinct clinical functions. Staff move women to services, facilities and fellow professionals located elsewhere along linear routes (red lines) in schematic diagrams of maternity units (Fig. 3). Again, this contradicts *Better Births* policy, since it prioritizes staff spatial use over women’s experiences of such spaces.

3.2.3. Single-function birth space

Thirdly, *HB09-02 Maternity Facilities* focuses on the design of the birth room as the one room designed for the ‘safe care of both mother and baby’ [29] during childbirth. The document reiterates this ‘single function’ understanding of architectural space by telling designers that baby care given in this room as a ‘non-birthing’ [29] activity. The *NCT Better Birth Environment Audit Toolkit* focuses on the birth room too and environmental factors that help or hinder birth. Environmental factors found to be important in *NCT BBE*, such as cleanliness, access to water and labor aids, did not emerge strongly in the interview data.4. *Woman-centered personalized approach*

Finally, women as building users who have their own needs within a space is underplayed in the *HBN09-02 Maternity Facilities* design guidance document. A woman, her supporting partners, and a baby after s/he is born, are conspicuously absent from *HBN09-02*’s illustrations (Fig. 4 is typical). Only clinicians (‘Mid’ and ‘Obs’) and equipment (‘CTG’, ‘dressing trolley’ and ‘cot’) are labelled. This contrasts with both *Better Births* and the *NCT Better Birth Environment Audit Toolkit* which both place the woman at the center of care and birth spaces. The woman and her birth partner are a strong focus of illustrations (Fig. 5) and her use of space is personalized by using her name in written descriptions.



Birthing room set up for high-risk birth



Birthing room set up for low-risk birth
Both: Courtesy Queen Elizabeth Hospital NHS Trust
Photographer: Lisa Payne

Fig. 2. Room categories in design guidance.

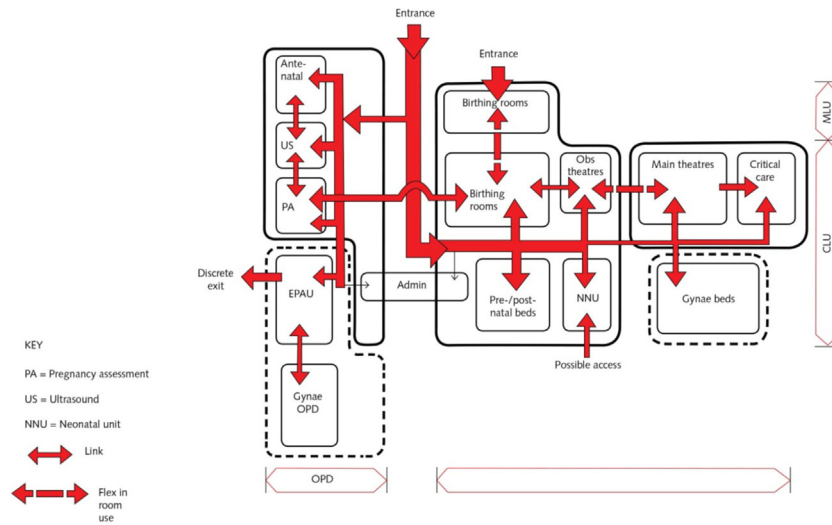


Fig. 3. HBN09-02: professional boundaries translated into spatial layouts.

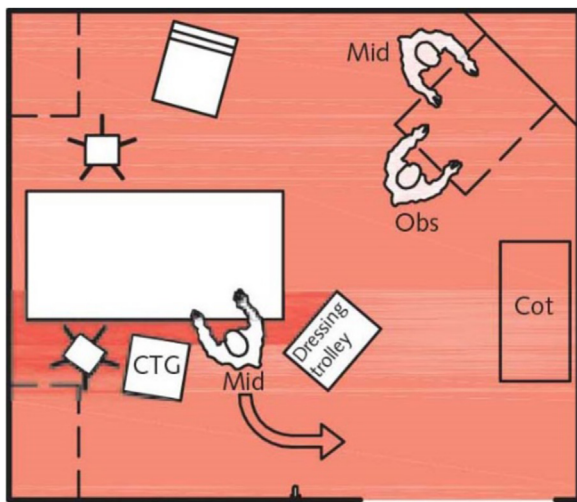


Fig. 4. HBN09-02: A typical birth room.

Better Births also advocates ‘personalized care’ and ‘continuity of carer’ as illustrated in infographics from the policy with a woman is at the “center” of her care (Fig. 6).

These four spatial categorization concepts shape birth spaces production. In the interview data analysis, I took interest in the forms in which they might emerge in women’s experiences. In reporting women’s experiences next, I identify the affective, interpersonal nature of women’s spatial experiences and how they remember birth spaces architecture according to a sense of being on a journey, before presenting the two distinct patterns of spatial use which reflect how birth spaces are produced.

3.3. Experiences of birth spaces from the interview data

The interview data were analyzed with an understanding that when women are in labor, they experience birth spaces architecture in an affective, interpersonal way. Within women’s experiences four sub-themes emerged connected to birth spaces architecture: medical risk, a tripartite clinical approach, single-function birth spaces, and a woman-centered approach (personal meaning-making). Fifteen women were first-time mothers and nine had previous birth experiences. Ten had straightforward



Megan tries another upright, supported, leaning forward position.

Fig. 5. A woman's use of space illustrated in NCT BBE.

births (seven in birth rooms of the consultant-led units, two at home, one in the birth center), five had water births (four at home, one in the birth center), four had caesarean births, and two forceps birth in operating theatres, five of the labors were induced.

3.3.1. Birth spaces architecture is affective, interpersonal space

A room is a different place when experienced through the heightened sensations and emotions of childbirth. Feelings about who she felt she was, and how she related to other people in the

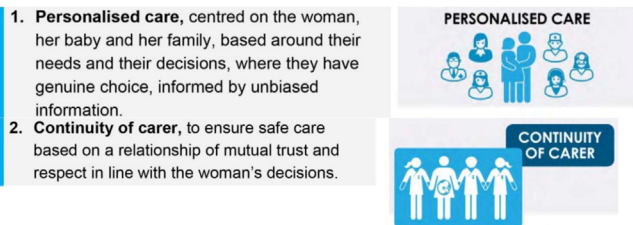


Fig. 6. Better Births: Infographics with a woman at the “center” of her care.

space often featured in women’s descriptions. Birth spaces architecture is understood to a significant degree, through a woman’s interpersonal relationships, as Jasmine notes,

Sometimes I’ve been thinking I’ve been talking about things that aren’t related to ‘space.’ So, talking about feelings and **people** [her emphasis] who were right in the space, as we’re talking about them, I keep thinking should I be talking about that? Because that’s not about a space . . . but it is.” **Jasmine**

Some women form strong attachment bonds with birth spaces, like Felicia, who recalled a previous birth during the interview, still remembering where it took place with strong feeling three years later:

I was explaining to [older child] . . . where he was born . . . and I said, “you were born right here” [said with great joy]. And he was like, “what there?” . . . “exactly where I’m sitting.” You look back and it’s like “oh yes, it was actually there” and you own it a little bit more, I think. Because it’s in my space and it’s in my home. **Felicia**

3.3.2. Birth spaces architecture is an amalgam of rooms and progressive like a journey

Women’s experiences contradict the third spatial categorization concept identified in the document analysis. They recall experiences as an amalgam of everywhere used in labor, birth, and post-birth. Fig. 7 illustrates that Aven drew her living room, birth center room and en suite merged in her drawing.

Many women sense a “right” order of rooms and “right” amount of time spent in each room before moving on:

I didn’t want to be in one [room] . . . I didn’t start off in the place I wanted to end up . . . labor is a journey . . . you start off in the bathroom, having a bath, taking your clothes off and then you end up in the birth pool or wherever you end up, so it’s a physical journey as well. **Felicia**

Room layouts give women cues on the appropriate amount of time to spend there. Rose described the maternity assessment center as appropriate for ‘a smear test length of time. Come in, quick check, that’s really all they’re suitable for.’ However, many feel too long is spent in these earlier spaces and too little time spent in the later rooms that women really want to occupy causing ‘so much uncertainty that’ Urbinia, ‘couldn’t relax.’ Expecting a short wait in a room makes women more reluctant to move furniture to make rooms more comfortable: ‘it was a bit temporary and . . . I suppose you just can’t make it your own can you when it’s like that’ (**Kerria**).

Within the order of rooms experienced, the rooms early on a woman’s route influence how she responds to later ones, and her imagined labor and birth outcome. After waiting supine on a bed in a “medicalized” hospital ward, Yarrow, Heather and Kerria found that, to their own surprise, they continued their inactivity in later birth rooms. Thus, prior experiences modify the advantages for labor physiology designed into later rooms, for example providing active birth equipment.

Iris understood the environment to have ‘a huge influence.’ Interactions with physical spaces became less important for her

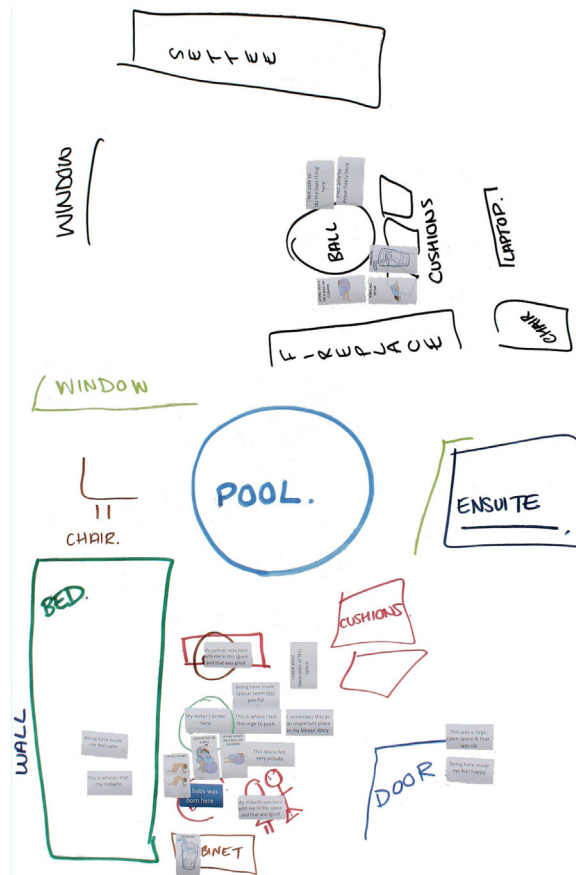


Fig. 7. Aven’s drawing shows her birth experience as an amalgam of rooms.

when she used hypnobirthing techniques to take with her the ‘mental environment’ of her hoped for home birth, when she transferred to hospital. Her experience was an exception and the building with its associated layout and care culture influenced most women’s experiences.

Rich, positive room attachments are most common for home-based births; possibly because women have greater opportunities to spend time in, and make changes to, rooms at home. A lesser attachment to ‘my room’ (**Quassia**), and a labor focus on getting to ‘my room’, emerged for hospital-based births. Most women wanted to know which room they would give birth in as soon as possible after labor had started. However, the management of rooms in the healthcare settings was not set up to facilitate this. Heather chose to wait alone in her birth room before a midwife was available because she was ‘desperate’ to get to the room she would give birth in. Oleander saw her birth room first before walking in the hospital grounds and was deeply reassured: “ah, oh gosh this is the room”. It was a very emotional feeling that this is a very important room’.

3.3.3. Two patterns of spatial use

Two patterns of spatial use - ‘wait and transfer’ and ‘prosume and curate’ – emerged from women’s experiences. A ‘wait and transfer’ pattern is when a woman makes transfers between rooms and waits to move on; usually directed by a health professional and is common in hospital buildings. A ‘curate and prosume’ pattern is when women adapt spaces either before labor or during labor and then move freely between spaces. I use the term ‘curate’ for this adaptation of space when it occurs before labor starts, after the work of Schalk [42] who defines curation of architectural space as selecting, organizing and looking after objects within a space. When this adaptation happens during labor this is a form of

'prosumption' of spaces. The term 'prosumption' was first used to capture how internet content can be created and used at the same time, often by the same people [43]. A 'curate and prosume' pattern a more common experience for women who had planned a home birth. Women desire to curate and prosume in healthcare buildings, and a minority achieved this. Women had less 'expert' knowledge of rooms and objects (Schalk's description of curating space [42]) in healthcare buildings in order to 'curate' them. Examples shared later in the findings also demonstrate women cannot move as freely as they wish - to 'prosume' spaces - in building layouts which facilitate staff movement; women were also less familiar with, and likely to discover affordances in, furniture and objects. The four spatial categorization concepts found in the document analysis resonated with women's described experiences. Table 3 summaries how these concepts relate to the two patterns of spatial use, before presenting findings for each of the patterns in turn.

3.4. 'Wait and transfer'

The interview process charted above established that women's spatial experiences are affective and interpersonal and remember as if on a journey. The first pattern of spatial use identified in these findings, 'Wait and transfer' describes a 'stop-start' journey through labor. Attending routine pregnancy appointments in a healthcare building normalizes periods of waiting for women in such buildings and the routine assessment of potential risk factors:

You go there [the hospital] along the way . . . you start to see different bits of it and you're having scans and things to check if stuff is OK or not, because sometimes it is not OK, so it is risky. You're going in and out of that setting again, and again. **Jasmine**

Pregnant women also visit maternity facilities during hospital-based antenatal education tours which implicitly re-iterate the importance of considering risk:

. . . although it's nice that you go have a look round it . . . there are lower risk and higher risk rooms so that kind of reinforces [risk categories], and in fact that stayed with me the whole time. **Jasmine**

Midwives conducting these tours often present birth rooms according to their designated risk category – high or consultant-led; low or midwife-led. This may occur because this is how building guidance lays out the building and therefore midwives make sense of the layout in this way. Women imagine themselves confidently laboring in the "best rooms" they see, the low-risk, well-furnished and attractive rooms:

When I went for my tour round, they showed us a really posh delivery suite with a big bath and mood lighting, en suite and it looked lovely, like a spa. Kept thinking, "I can imagine myself in this." It will be alright; I could cope with this. **Kerria**

Being 'shown round just the rooms' on her antenatal tour led Jasmine, similarly to others, to expect that she would go straight to a birth room, 'I didn't realize you would go to the bit where they assess how well you're doing first'. Women understood the building layout to 'physically categorize' (Jasmine) a woman's ability to labor and send her along one of several pre-ordained routes: 'it feels like going down on a kind of ladder' (Jasmine). Women have an emotional response to their interpretations of the category of room allocated to them as a sign of how staff expect them to labor – well or not so well. Quassia felt delight and relief in her 'home-from-home' low-risk birth room, and Heather felt concern in a room next to the operating theatre:

They said, when we were doing the tour beforehand . . . you are in the labor ward, you are higher risk but there are low risk, high risk and there are high risk, high risk. So, I went in and the room was very big, and it was right next to theatre. I thought so I'm high risk, high risk . . . **Heather**

These women's experiences show that laboring women often interpret the medical risk category of a hospital birth room without discussion with staff caring for them.

Women found all transfers at all stages of labor significant - whether travelling from home to hospital or changing rooms within the same building during active labor. The number of rooms visited in hospital often exceed women's expectations, like Briony who used 'an awful lot of rooms'. Transfers also expose women to many staff members: 'we must have seen most of the midwives that worked on the birth center or the medical ward!' (Briony).

Table 3
Patterns of spatial use, characteristics, and descriptions.

Spatial categorization concepts used in production of spaces:	Patterns of spatial use:	
	1. Wait and transfer	2. Curate and prosume
1. Medical Risk	Routine hospital appointments/antenatal tours disseminate knowledge of risk categories Women focus on "best" rooms seen on antenatal tours Women interpret rooms according to risk categories when they enter them during labor	Planned birth spaces familiar through everyday use and not seen as risky. Have a sense that these spaces are 'safe' formed by knowing other women's childbirth experiences in such spaces through support networks
2. Tripartite clinical approach	A series of 'waiting rooms'; waiting for permission to move on Short-term room occupation at each stage - but longer than wanted. Luggage and possessions important; sense of disorganization with changes in location.	Labor sensations urge women to move between rooms; or according to who she wants to have in the space Repeated use of rooms. Most women only enter the prepared birth space when they feel ready to do so
3. Single-function birth space	'My room' not knowable when labor starts and only discovered close to the birth.	'Everything in its usual place' - luggage not important Rooms have temporary new functions for labor and birth e.g. kitchen as a 'midwife holding pen'. Birth room prepared and/or known in advance of labor starting but not a rigidly defined function for this room that also serves purposes after the birth. Birth rooms return to a new normal state after birth. Deep emotional connection with the 'birthing spot'
4. Woman-centered approach (personal meaning-making)	Knowing the birth room feels important in early labor Weak ongoing attachment to birth room afterwards	Daily interactions and storytelling with children strengthen attachment 'Birthing spots' render a woman's house a special place

Women describe many types of hospital spaces 'like a waiting room' (**Heather**). Yarrow described her mental struggle whilst waiting on an antenatal ward and her relief when she moved to a birth room: "we'd arrived and was going to have a baby and stopped all the limbo of waiting around to go into labor" (**Yarrow**). Some women expressed surprise that they did not move around when waiting. Quassia described herself as an active person but then 'sat down and curled up and waited for it to happen'; others unconsciously behaved as if waiting:

I just spent a lot of time pacing around almost like a caged animal, you know when you see them do a figure of eight. I'm surprised there isn't a trail in the carpet where I just went like that [figure of eight]. It wasn't that I used the space in a nice relaxing way; I used it in the kind of "I'm waiting to go somewhere else" kind of way. **Jasmine**

Midwife interactions can unintentionally contribute to less active waiting during labor when being active might be beneficial. Most women become physically inactive whilst waiting upon another person:

When I came in at 6 in the morning . . . somebody showed me in and said, "sit on the bed and wait for the midwife." So that's what I did. I remember sitting there and looking at the door waiting for somebody. **Oleander**

Jasmine even attempted to modify her physiological symptoms to influence those decision-makers:

I remember my blood pressure being too high initially . . . and then having to wait while they check it again . . . and thinking "well you just need to relax! . . . so, you can get to the good room." **Jasmine**

A midwife transferred Kerria by wheelchair to a birth room and this led her to remain seated in the hospital chair and less inclined to get up and walk around. Transfer by wheelchair can also increase 'pain . . . it wasn't nice at all' (**Rose**). In contrast, Urbinia rejected hospital staff's offers of help and walked everywhere whilst in labor, 'it felt quite liberating . . . walking down the corridor was really good'.

The content of conversations overheard whilst waiting in shared ward spaces often fills women's thoughts and they relate them to their own experiences. Urbinia, 'overheard those people being sent home. I thought, 'oh my gosh I'm going to be sent home now' and then later she felt, 'just really relieved I wasn't going to get sent home because I overheard that conversation.' Even though conversations are overheard from behind hospital curtains, women remember details of conversations including an accurate knowledge of a woman's location in the room, her perceived stage of labor and who accompanied her. Women become aware of previously unconsidered labor problems or risks to their baby. Some find these spaces de-personalizing - Peony felt like 'just a body' being monitored.

In contrast, waiting to transfer is not a strong theme in women's stories of planned home births. Looking at the interview stickers prompted Daphne to think about waiting 'but it's not like "waited for an appointment"'. There is no sense of 'waiting for external factors' (**Nikko**), instead, waiting is focused attention on the physical sensations of labor: 'a sense of observing and waiting . . . for my body to do the next bit' (**Nikko**).

Some women described learning relaxation techniques as self-help labor coping strategies, but the act of waiting seems to mitigate relaxation. Rose commented that 'home is the better place to labor . . . by definition, it is a relaxing area'. However, when at home many women felt they waited for labor to start even when obviously feeling labor sensations. Being ready to set off with their luggage preoccupies women's thoughts:

You can't relax because you're not in the right place . . . all this stuff isn't in the right place. It's by the door . . . waiting . . . it's another sign that you're waiting to go and then you're going far enough away that you've got to take all this stuff with you, like a journey, you don't pack bags like that unless you're going somewhere far. So, it doesn't make home feel nice and relaxing.

Jasmine

The problem of "what to do with my luggage", and a sense of disorganization, continues throughout a hospital-based experience: 'I was conscious that I had lots of stuff and it was everywhere' (**Gardenia**). Every time Kerria moved room her sense of disorganization increased and once they arrived in the birth room, her birth partner could no longer find things she needed. Women reported hospital rooms as temporary spaces, Jasmine described the maternity assessment ward as a 'holding pen when you first get there' and Quassia remembered 'squatting there' in one hospital room.

A midwife performs an internal cervical examination upon arrival at hospital to assess if a woman is in "active labor"; the stage at which most UK hospital policies would then allow them to stay. A woman cannot complete this examination on herself, and many placed importance on getting to hospital as soon as they could to understand their labor, but at the same time only wanting to travel to hospital once. Women who are asked to return home distrust their judgement of their labor, 'you're waiting for something to happen that they might not think has happened, but you think it's already happened' (**Briony**). Self-confidence wanes with the sense that time spent waiting so far has been wasted and a woman doubts her ability to continue waiting at home: 'maybe I have a really low pain threshold . . . maybe I haven't been coping that well at home. Whereas I thought I'd done quite well at home' (**Lily**). Women feel stuck at in a certain stage of labor if they cannot move to the next physical space at the time they expect. Lily, 'was hoping I was going to go onto the next stage' and returning to her bedroom at home felt like re-starting labor.

Only when women sensed they knew where they would give birth did waiting behaviors stop. Jasmine described laboring within one hospital room as distracting:

It is a bit "you're in there right from the start". I can still see myself in that room . . . in the hospital, it was quite big, had lots of space to move around, it was still just one space and that really mattered. At various points in time . . . as I was in there in labor, I'm thinking "I wonder where I am going to give birth then?" . . . "Is it going to be in here? On the bed there?"

Jasmine

A birth center midwife showed Vitex into a birth room before assessing her labor, and then left momentarily. Vitex 'waited on them, because they said they would come and examine you'. She did not use the gym ball and sling which she recognized as labor aids, or coping strategies which served her well at home: 'this was the worst part of my labor. I felt it wasn't constructive . . . because it was where I waited'. When she transferred to a second room, she regained a sense of action: 'once I got in there . . . into the birthing pool it was like, "right this is it . . . we're going to have the baby in here" and we're going to get it done' (**Vitex**).

In the birth center, women could transfer directly home with their baby. Aven did not use the pool for the birth, but she associated it with birth and 'it was quite odd, [when] we spent our first night together in that room with the pool.' Quassia felt similar discomfort with caring for her baby in the birth room,

I did feed him but you need to then move on to wherever you're going to go to . . . if it's home or staying in the hospital a bit longer, and I don't think the birth room was the right place to do that. **Quassia**

Women expressed a sense of “right” in terms of which room was appropriate for which stage and when to move on.

Women who ‘wait and transfer’ across healthcare buildings rarely reminisce fondly about where their baby was born. Some, like Heather are glad to never go back: *I think emotionally, it probably made it easier to draw it here [at home] than going back to the hospital*. ‘Wait and transfer’ pattern felt like a pattern imposed on women which required multiple negotiations with midwives and contrasts with ‘curate and prosume’ as a more self-generated pattern of spatial use. Women described birth spaces in more positive terms when they could use this second pattern of spatial use.

3.5. ‘Curate and prosume’

For this second pattern of spatial use, women often spent time at the end of pregnancy planning and curating where they would labor and give birth. Many women planning home births attend home birth support groups, to ‘hear people talk’ (**Jasmine**) about their experiences. Routine hospital appointments familiarize women with hospital spaces and childbirth as risky. Contrastingly, during pregnancy these women familiarize themselves with their home as a flexible place for labor and childbirth as safe: *you meet people who have a positive view on birth, that all rubs off on you and slowly over time* (**Jasmine**). Although rarer, similar expectations are possible for a hospital-based room; Urbinia familiarized herself with the room she requested in labor on an antenatal tour.

Women planning home births spend time during pregnancy imagining how their home spaces and furniture might help in labor; identify a planned birth space and often select a suitable place for midwives to wait. Only one woman mentioned packing a labor bag, otherwise *everything [was] in its usual place* Daphne. Most did not worry about their baby’s wellbeing or prepare special things for the baby compared to those exposed to monitoring in hospital buildings:

It sounds like I’m not thinking about them but they just need you to start with (. . .) I can’t really remember that bit because it wasn’t really important (. . .) there was nothing, you know there was a Moses basket and stuff upstairs but nothing down here. **Jasmine**

Jasmine and Kerria created a ‘midwife station’ (**Jasmine**) in the kitchen with a supply of tea, coffee, and biscuits, just outside their planned space for the actual birth. Felicia also planned a route into her house so the midwives did not enter the birth space until she was ready; including ‘three doors they had to get through before they get to me’ (Fig. 8) and battery-operated candles as way markers down the side of the house.

Many women *‘just feel really reassured somehow’* (**Jasmine**) that they have a known birth room planned before labor starts. It is common for women to make major changes to room layouts when curating birth spaces, sometimes a month or so before the expected birth. To accommodate a birth pool, Felicia stored her sofa in a friend’s garage, Daphne pushed the dining table into her living space, and Cassia re-arranged her kitchen (Fig. 9).

Women hope to add social meaning to their labor experiences by curating spaces. On a bookshelf, Felicia’s bookshelf ‘birth altar’ of objects given to her during a Blessingway ceremony connected her to the gift-givers; scan photos on the mantelpiece next to the birthing pool connected Iris, and her husband, to their unborn son.

Women who plan home births express ease with prosuming their birth spaces, in contrast to those who ‘wait and transfer’, and with discovering new affordances for room layouts and furniture to aid their labor experience. Jasmine’s kitchen was a ‘passing place’

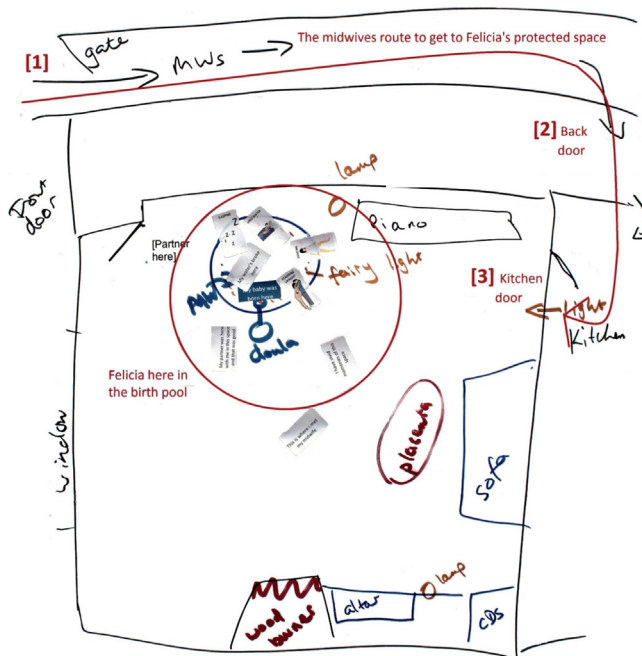


Fig. 8. Felicia’s drawing (annotated to show the midwives’ route).

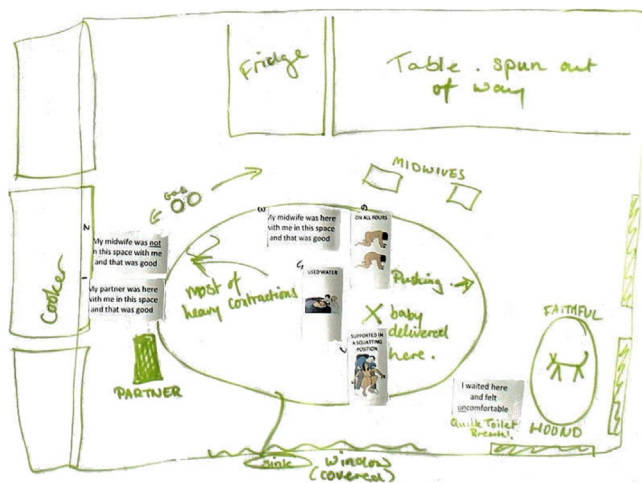


Fig. 9. Cassia re-arranged the kitchen for her birth pool.

for working through contractions en-route to the downstairs toilet:

‘a kitchen worktop happens to be just at the right height to sort of lean over . . . that was a good spot . . . stop on the way for a contraction then come into the toilet and back out again. I did a lot of [it]’ **Jasmine**

Like Jasmine in her kitchen, prosuming women repeatedly moved between rooms, between downstairs and upstairs, or returned to certain items of furniture in response to contractions. Nikko leant on a ledge below her boat’s hatch:

The right height, exactly . . . it was all perfect just for what I needed . . . I did a lot of leaning here . . . out the hatch, circling and swaying. **Nikko**

Felicia described her home as ‘pockets of rooms’ - a series of connected spaces with open doors and easy to move between - ‘it

was all connected.’ Women prosume spaces without much forethought, but simply move to where feels “right”:

It took my mind in different places, knowing that I was going to move from one space into another . . . almost as if you’re moving through the stages of labor through the space. **Jasmine**

Lily valued free access to many rooms within the same building for her unplanned home birth:

“right you’re ready to now, progress to the next room” . . . that didn’t appeal to me at all. I gave birth in the same rooms that I started my labor in, and that was really nice. I think that’s what made it feel quite complete and sort of helped me to be OK with it [being unplanned at home]. **Lily**

Factors in Urbinia’s experience show it is possible to prosume spaces in healthcare buildings. Firstly, her room at the end of an L-shaped corridor, ‘felt a lot more private’. Secondly, it had two co-joined spaces (a birthing space and an en suite) between which

she moved freely. She also found affordances in furniture moved from the side of the room to the center as and when she needed it. To a lesser extent, other women with co-joined hospital spaces (see Fig. 10) prosumed space, in that they moved freely between the two spaces but did not readily find affordances.

The ‘curation’ process continues with “dismantling” where the birth happened. After giving birth women move away and expect signs of the birth to be quickly removed, for example, by a partner emptying and removing a birthing pool: ‘I don’t think anyone wanted to be near the mingy birth pool after [laughs]’ (**Daphne**). Ongoing access to the room of the birth without seeing any evidence of the birth, expressed the ‘new normal’ of Jasmine’s family that now included the baby:

I didn’t want to go back in here [room where the birth took place] for quite a while after . . . I wasn’t then interested in this space at all [laughs]. I was hoping that by the time I came back in here there was not really any sign of it having happened any

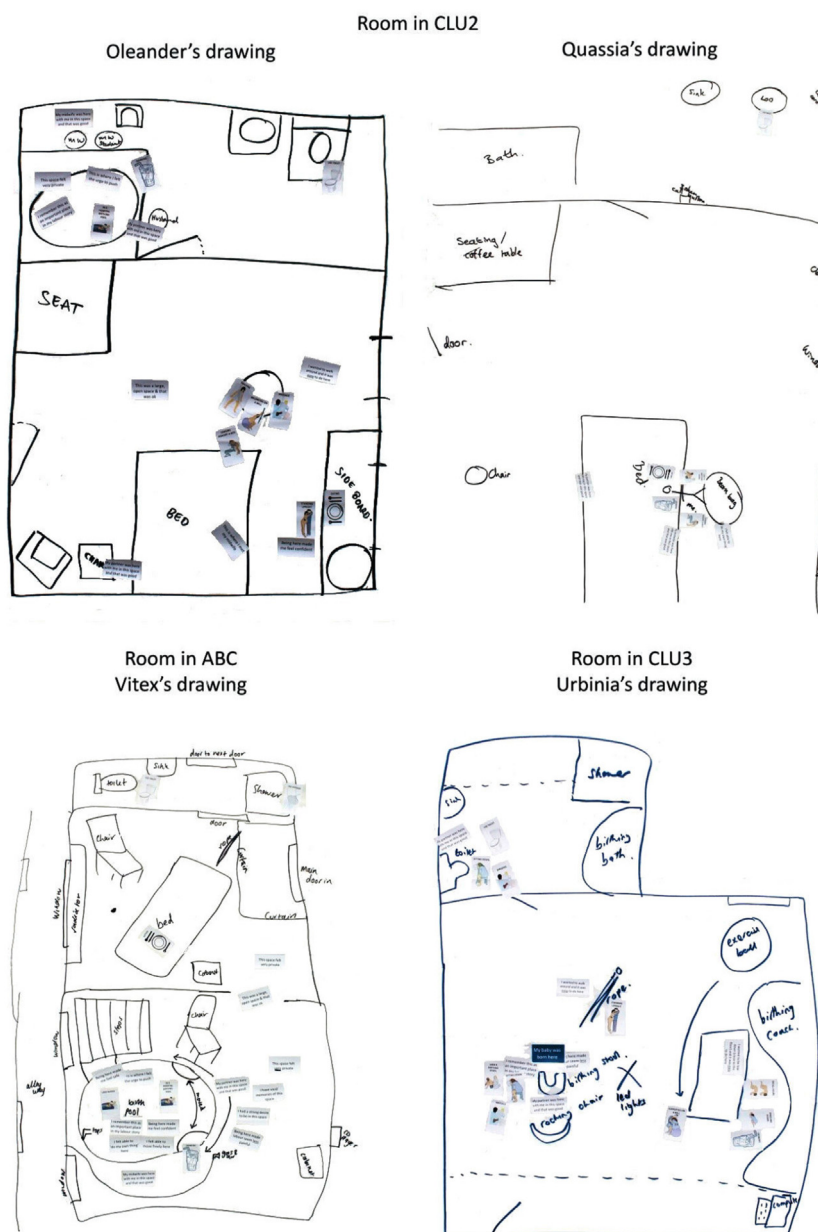


Fig. 10. Three co-joined hospital rooms.

more? That sounds like you don't want to remember it, but more just all the kind of equipment and everything got sorted and all this stuff . . . didn't need any of that anymore. I just wanted that **gone** and it be back to being 'our house' and as if it was then **always** just the four of us. Just the new normal and so it could stay like that but without having to see reminders of before she was here because that was the "old life" before she was around. **Jasmine**

Women who 'curate and prosume' often develop strong long-term attachments and special memories of the 'birthing spots' (**Nikko**) where they gave birth. Positive, distinctly birth-related feelings for these 'spots' continue long after childbirth is over, possibly because women can access them every day:

I've never liked this house. We bought it because it was a good deal . . . but we've never really intended on staying here. Now that [baby]'s been born here . . . [expressively] this house means a lot to me! **Daphne**

Lily's everyday use of the bathroom, her son's birth place, aided her attachment to him: 'I've been able to visit those spaces over and over again and think, every time I'm in the bathroom, oh he was born there.' She recorded her son's six-month "birthday" with a photograph of him taken in the bathroom.

Urbina formed a similar strong positive attachment to a hospital birth room which evolved over time: she chose the same hospital as she was born in, liked the room when she saw it on a tour and then requested it during labor. After the birth she occupied the en suite, whilst the place of birth was returned to its original furniture layout. Finally, when her family met her baby in the room before she was discharged from hospital, this made it feel like 'her home'.

4. Discussion

The aim of this study was to explore spatial concepts found in policy design guidance for producing birth spaces architecture and women's experiences of labor and birth in such spaces. I combine social science, midwifery, and architectural methodologies, interpret qualitative data generated by analyzing UK regulatory documents and interviews with UK mothers and identify two new patterns of spatial use for birth space architecture. This study offers new knowledge of affective and interpersonal aspects of women's spatial experiences to inform woman-centered birth spaces architecture.

'Wait and transfer' is a common pattern of spatial use within hospital buildings in which laboring women become less active when they sense they are waiting and less inclined to use labor coping strategies. Women often do not know how to labor in their own homes and do not necessarily find it a relaxing place, especially when waiting. This is contrary to the theory that home is women's familiar territory and hospital is strange often found in midwifery literature [44]. Women become familiar with ideas on laboring in hospital and hospital as "the place" for birth through routine appointments and antenatal education. This familiarization process introduces a system of room categories which women internalize and later use during labor to assess their birth experiences. Hence, this study provides evidence to change the architecture of spaces where routine appointments and antenatal education are delivered so that it reflects medical risk less and woman-centered care more. Showing women additional areas on antenatal tours (for example, maternity assessment units, operating theatres, or recovery rooms) should be considered carefully in order to create prior room expectations that are reassuring.

Many women spoke positively about using birth spaces in a 'curate and prosume' pattern. It aids comfort in using room layouts

and furniture and a woman's sense of freedom in moving between spaces. Women also feel reassured and more relaxed by knowing the room where they will give birth in advance. The study highlights the social phenomenon of place attachment to the 'birthing spot'. We do not know the implications of so many women not being able to form such place-based ties to their birth experiences because they had these experiences in hospital. It is possible that further study of how women make connections between the birth space and their relationship with their child may give new insights into early maternal-infant attachment, and aspects of perinatal mental health and breastfeeding initiation.

Faster and more interdisciplinary process are needed for updating regulatory documents for birth space architecture to keep design guidance in line with current midwifery care philosophies such as woman-centered care. Knowledge production is a cumulative research community endeavour [45] where knowledge evolves over time, meaning that some of this inconsistency may result from cumbersome or discipline-based processes for updated such documents.

This paper also extends emergent architectural debates on user-centered and 'empathic design' [46] and in so doing, updates debates on the 'medicalization' of childbirth [47] and healthcare architecture [7]. It takes a different starting point for understanding birth spaces architecture to that it explores the concepts from which spaces are constructed and brings these together with women's spatial experiences. These findings which show that when birth spaces are experienced, they are interpreted in affective and interpersonal ways compliment recent studies on the salutogenic nature of birth space [48] with less of a focus on architecture which supports physiological birth [49] and more of a focus on childbirth as a social experience within buildings. Conversely, this user-centered approach challenges the common technical investigation of spaces, for example, in terms of lighting, infection control or safe use of medical gases, found in much of healthcare architecture research. I take a different approach to architectural studies of birth environments, such as the comprehensive review of Setola et al. [50] because the focus of this study is embodied experience, rather than identifying design elements for further investigation in relation to their impact on intrapartum interventions.

The strength of this study is the rich data elicited from qualitative interviews with drawing methods. This new method worked well to enable women to focus on spatial experiences which is not a common element expressed in women's accounts of childbirth. The documents analyzed are diverse in their scope as regulatory, policy and advisory, but a challenge remains in investigating the production of birth spaces architecture through this method since there is a limited number of healthcare architecture regulatory documents tailored to maternity facilities. The sample offered a balanced number of experiences of the available birth venues. I acknowledge that using a self-selecting sample, did not encourage cultural or racial diversity within the sample and that culture and race could be potentially significant factors in spatial experience. It is possible that the period between giving birth and taking part in interviews may impact on how favorably or negatively women remember the spaces that they used [51].

Birth spaces investigated and designed as an experiential continuum - before, during and after birth - will reflect women's experiences more fully. Regulatory design guidance can shift from portraying women as non-existent within spaces or as behaving in standardized ways. For example, if NHS England's HBN09-02 document reflected laboring women's preference minimize transfers within a healthcare building and make possible birth spaces which women can 'curate and prosume' as their preferred pattern of spatial use. Reducing women's transfers across buildings also

has the potential to contribute to achieving 'continuity of carer' as a significant goal of current NHS Maternity Transformation programs by reducing how many staff women encounter.

5. Conclusion

Birth spaces architecture research needs to be situated in current practice and policy contexts and regularly reassessed as societal norms evolve. Regulatory design guidance for maternity facilities still delivers similar birth spaces to those first created post-war when childbirth moved wholeheartedly into hospitals. This new evidence can act as a catalyst for architectural design to evolve in similar ways to maternity policy. The methodologies and methods applied here to women's experiences of birth spaces can be extended to other building users present at births - their birth supporters and clinical staff for example. Researching experiences of other places along the continuum of childbirth spatial journeys, such as antenatal clinics, operating theatres and postnatal spaces will build this new sociology of birth space architecture. A sociology which can permeate new knowledge into architectural social theory and design regulations with the aim of positively benefitting the health of future childbearing people and families.

Author agreement

The article is the author's original work and has not received prior publication and is not under consideration for publication elsewhere. I have approved the manuscript being submitted and I abide by the copyright terms and conditions of Elsevier and the Australian College of Midwives.

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Ethical approval

The study received a 'favourable ethical opinion' from The Proportionate Review Sub-committee of the UK NRES Committee South Central - Oxford C on 12 November 2014.

Conflict of interest

None declared.

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