

# **BirthSpace: An evidence-based guide to birth environment design**

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## Executive Summary

A safe and satisfying birth experience depends, in part, on the level of stress experienced by the birthing woman. While other aspects, such as models of care, have seen considerable change in recent years, most birth rooms remain relatively clinical environments. This guide aims to review the available evidence on birth environment design to identify features that minimise maternal stress, and facilitate the physiology of labour and birth, thereby contributing to safe and satisfying birth experiences for all women. While some environmental changes will be appropriate only for women anticipating uncomplicated labour and birth, many of the environmental changes can be made to improve the birthing experience of all women, irrespective of risk status.

For many women, the hospital birth environment is foreign and provokes fear and anxiety. Fear and anxiety can interrupt the delicate neuro-hormonal influences that drive labour and birth, making intervention more likely. Intervention, in turn, is associated with greater risk of a dissatisfying birth experience, trauma and postnatal mood disorders with potentially life-long consequences for the wellbeing of women, babies and families. There is growing evidence that birth spaces can be designed to feel safe and calming, and that these are associated with reduced intervention rates, good clinical outcomes and positive birthing experiences for women.

This guide examines a number of key elements in the design of a birth space. These include:

- Privacy
- The bed
- Access to immersion in water
- Shower and ensuite toilet
- Lighting
- Windows
- Noise
- Décor, furniture and equipment
- Ability and space to move around
- Inclusion of nature
- Ease of access
- Olfactory aspects
- Personal items
- Provisions for support people
- Cultural considerations.

The overall focus is on the creation of a space in which women are most likely to feel safe and relaxed during labour and birth. Such an environment is characterised by privacy and homeliness, and provides the woman with a sense of personal control. Specifically:

- Doors and windows should be positioned and covered or screened so as to protect the privacy of the birthing woman.
- Furniture should encourage and support women to adopt non-supine positions for labour and birth.
- A bath, suitable for water immersion, should be available in all birth rooms.

- All birth rooms should include an ensuite bathroom with a shower and private toilet.
- Deep, non-reflective colour schemes should be used.
- Lighting design should contribute to a calming ambience.
- Birth rooms should be spacious and support and encourage women to maintain mobility.
- Birth rooms should provide easy access to private courtyards and gardens.
- Spaces should be provided in the birth room to encourage women to personalise their environment.
- Birth rooms should accommodate support people comfortably.
- Local community should be consulted regarding the design of culturally safe birth spaces.
- Birth rooms should allow access to outdoor spaces and support locally relevant traditional ceremonies.

An accompanying information sheet, entitled *Your Birth Space: How to plan, negotiate and create an optimal birth environment* is also available for women preparing for birth. It can be downloaded from [www.qcmb.org.au/birthspace](http://www.qcmb.org.au/birthspace).

## 1. Introduction

Childbirth is a life-changing event for women and families. While the concept of woman-centred care has, in many cases, altered the way that health services organise and deliver maternity care, there has been relatively little attention given to the physical environment in which most women labour and birth. Although birth suites have evolved, woman-centered designs are most evident in birth centres which, for a variety of reasons, relatively few women can access for birth.

All women need to feel safe during labour and birth<sup>22</sup> and feelings of safety and satisfaction are influenced by the birth environment.<sup>23, 24</sup> According to Walsh<sup>25</sup> the setting for birth can be “the difference between a fulfilling and a traumatic childbirth experience”. This guide examines key elements of the birth environment that may impact on women’s ability to give birth and their experience of doing so. It is intended for use by architects, designers, policy makers, clinicians and consumers involved in the planning of new birth environments or considering refurbishments. It can also inform women and clinicians about how to modify or augment existing birth spaces.

## 2. Background

Safety is of paramount importance to both birthing women and maternity care providers. Care must ‘feel’ safe in order to be safe.<sup>26</sup> Foureur reports that this feeling of safety is underpinned by the oxytocin system that drives labour and birth: “It is key to approaching the creation of safe birth spaces since it is the agent behind all states of relaxation and wellbeing”.<sup>27</sup>

The vast majority of Australian women birth in hospitals.<sup>28</sup> Accessing the hospital for birth means moving, during labour, from the familiar territory of home to the unfamiliar territory of hospital.<sup>29</sup> For many women, this transition is stressful and can interrupt labour, causing it to slow or stop.<sup>25, 30</sup> Although many women value the safety of the hospital environment, the feeling of being observed during labour may also provoke neuro-hormonal responses that interrupt labour and diminish the woman’s ability to labour and birth without intervention.<sup>22</sup>

Shin et al<sup>31</sup> suggest the three reasons birthing women may react negatively to hospital environments are the sterile and impersonal environment; the perceived likelihood of unnecessary medical interventions; and a lack of personal control. Each of these aspects is amenable to modification through thoughtful design that minimises discontinuities between home and hospital.<sup>31</sup> More broadly, Stenglin and Foureur<sup>22</sup> offer the concept of a ‘sanctum-like’ birth room, where homeliness, personal control over the space and privacy enable women to feel safe and secure. Shin et al<sup>31</sup> call for birth environments to feel homely, noting that homeliness is desirable to women and can designate the birth experience as a family-centred event, instead of an illness.

Minimising maternal anxiety can support the physiology of labour and birth. Anxiety can cause labour to slow or even stop.<sup>22, 30, 32</sup> It can also, via the action of adrenalin, restrict blood flow to the abdomen and therefore to the fetus, potentially contributing to fetal distress.<sup>33</sup> Slow labour and fetal distress are two of the main reasons for intervention in birth.<sup>22</sup> Intervention, in turn, is associated with dissatisfying birth experience, trauma and postnatal mood disorders with potential life-long consequences for the wellbeing of women, babies and families.<sup>34, 35</sup>

Historically, hospital birth environments were designed to facilitate the use of interventions.<sup>36</sup> In this way, the physical environment can unintentionally contribute to creating pathological rather than physiological spaces for labour and birth.<sup>37</sup> When environments are explicitly designed to complement birth physiology, studies have found decreased use of intrapartum analgesia, oxytocin augmentation, instrumental vaginal birth and episiotomy, as well as increased likelihood of spontaneous vaginal birth, breastfeeding at six-to-eight weeks and very positive views of care.<sup>38</sup>

Despite these favourable clinical outcomes, such birth rooms are largely confined to birth centres.<sup>39</sup> However, with relatively straightforward modification and additions, many traditional birth environments may be transformed to make them more supportive of the physiology of normal labour and birth. The first step to such a transformation may be an evaluation of the current birthing environment, perhaps using the BUDSET tool developed by researchers to assess the optimality of birthing environments (see Appendix A). This guide can then be used to inform improvement plans. Key elements that contribute to a calming and reassuring birthing environment have been identified and are presented in the following sections. These include: privacy; the bed; access to immersion in water; shower and ensuite toilet; lighting; windows; noise; décor, furniture and equipment; ability and space to move around; inclusion of nature; olfactory aspects; personal items; provisions for support people and cultural considerations. This guide provides an overview of each of these elements and offers evidence-based design recommendations that support their use in all birthing settings.

### 3. Privacy

Privacy is crucial to quieten the neocortex and support the release of the hormones necessary for labour and birth, including oxytocin.<sup>33</sup> The neocortex is the part of the mammalian brain responsible for higher cognitive functions (such as language and spatial reasoning). Feeling observed is associated with an increase in neocortical activity and the subsequent release of adrenaline.<sup>33, 40</sup> This impedes the release of the oxytocin that is necessary for labour, birth and mother-baby attachment.<sup>32</sup> To avoid feeling observed, many mammals seek privacy for birth. For example, chimpanzees give birth in private, quiet places, away from the main group<sup>33</sup> and Nile grass rats give birth outside of the hours of peak activity.<sup>41</sup>

The physical environment can support the hormonal processes of labour and birth by providing a sense of control over privacy.<sup>42</sup> Personal control over social interaction, especially interaction with non-family members, is important to birthing women.<sup>31</sup> In evaluations of single-room maternity care (where women are accommodated in one room from admission in early labour through to postnatal discharge), respect for privacy was one of the reasons women preferred the single-room approach.<sup>43, 44</sup>

Most of the positive effects of spatial layout of health care environments can be attributed to enhancing privacy.<sup>45</sup> Generous entry spaces and avoidance of exposed internal windows are important in birth rooms as these design features moderate contact between public and private spaces.<sup>31</sup> Women should not feel that they are within sight of others<sup>46</sup> and knocking before entry should be standard practice. Doors should not open directly into the birth room, but visual and physical barriers should be used to preserve privacy even when the door is open.<sup>31, 47</sup> Internal windows (windows between adjacent internal areas) should be avoided as these contribute to a

feeling of surveillance.<sup>22</sup> Moreover, external windows should allow natural light in, but not allow the activity in the room to be discernible to people outside (see also *Section 9. Lighting*, *Section 10. Windows* and *Section 13. Inclusion of nature*).

**Recommendations:**

- External doors should not open directly onto the birth environment. Secondary curtains or screens should be used to create a visible barrier, protecting the privacy of the birthing women even when the door is open.
- Knocking before entry should be standard practice. Displaying a 'please knock' sign on the door would encourage this.
- Windows should allow natural indirect light in, but protect the privacy of the occupants. This could be achieved with internal blinds or curtains, or in the size, orientation and placement of a window.
- Internal windows should be avoided. Where they are present, they should be fitted with blinds that are controlled from inside the room.

**4. The bed**

It is common practice to place the hospital bed in the centre of the birthing room. While this placement is largely due to the ease with which clinicians can access the women should intervention be required,<sup>48</sup> it makes the bed the focus of the room. This focus contributes to the sense of surveillance in the birth room.<sup>22</sup> Additionally, putting the bed in the centre makes the woman feel as though that is where she 'should' birth.<sup>49</sup>

Birthing on a bed or in a supine position is a modern phenomenon. Giving birth in upright positions was common in



Figure 2. A 'parturition' (birthing) chair from the 1600s.<sup>5</sup>

Western societies until the 17th century.<sup>50</sup> Women in traditional societies, including Australian Aboriginal women,<sup>51</sup> almost always chose to birth in upright positions.<sup>52</sup>

Although little is written about childbirth prior the 17<sup>th</sup> century, historical depictions of women giving birth portray the woman in an upright or squatting position, often using birthing or 'parturition' chairs (Figures 1<sup>3</sup> and 2<sup>5</sup>). Carvings and illustrations of women giving birth in non-supine positions are particularly common in ancient artwork (Figure 3). Squatting and, in particular, kneeling positions (sometimes on 'birthing bricks' as shown in Figure 4) were adopted by women in Ancient Egypt, and are still used by



Figure 1. Image from the earliest printed textbook for midwives (c.1515).<sup>3</sup>



Egyptian country women today.<sup>53</sup>



Figure 3. Ancient Egyptian hieroglyphic symbol for birth.<sup>10</sup>

From a physiological perspective, the ideal position in which humans (and all mammals with a similar fetal head to maternal pelvis size ratio) should give birth is an upright or squatting position.<sup>54</sup> Squatting is known to be beneficial in reducing back pain, supporting fetal oxygenation and can facilitate the rotation of the baby through the birth canal.<sup>33</sup> Upright birthing positions are also associated with a lower rates of forceps or vacuum-



Figure 4. Ancient depiction of woman on birthing bricks.<sup>13</sup>

assisted births and lower rates of episiotomy.<sup>55</sup> A Cochrane review on the topic of posture and mobility during labour found that women in upright postures had shorter labours, fewer caesarean sections, fewer epidurals and their babies were less likely to be admitted to the intensive care.<sup>56</sup>

The position adopted for birth may also have psychological significance to the woman.<sup>57</sup> Jordan contends that “the arrangement of the woman on the table [bed] effectively demarcates the lower part of her body as the domain of the specialist”.<sup>58</sup> Similarly, Gupta et al<sup>55</sup> include birth position amongst the “medical practices which may undermine or humiliate women during labour” and Swanson and Wojnar<sup>59</sup> note that such positioning preserves power imbalances that may undermine respectful relationships and, in turn, clinical outcomes.

Most women in hospitals now give birth on the bed, however doing so restricts their mobility and increases the likelihood that they will adopt a supine position for birth. Although women report that being confined to the bed is ‘unhelpful’,<sup>60</sup> a large survey found that 88.3% of women who had a vaginal birth in a hospital or birth centre in Queensland, gave birth on the bed.<sup>61</sup> More than a third (43.3%) of these women reported lying flat on their backs on the bed when they gave birth. Just 11.4% of women who gave birth on a bed in a hospital or birth centre were standing, squatting or kneeling, 31.9% were propped up or sitting, 7.3% were lying on their side, and 0.8% were in ‘other’ positions.

Conversely, when women have full control over their environment (for example, women birthing at home), most do not choose to use a bed or to even labour in a bedroom, preferring to give birth in the protected space between pieces of furniture.<sup>37</sup> They rarely expose themselves in the centre of a room<sup>37</sup> but choose protected areas where the bed is not the focal point.<sup>36</sup>

Freedom of movement and pushing in non-supine positions supports the normal physiology of birth<sup>32</sup> and is included in systems developed by the WHO for assessing care during normal labour and birth.<sup>62</sup> Supine positions restrict instinctive movements such as rocking and slanting of the pelvis which can help facilitate descent of the baby’s head and speed up the birthing process.<sup>49</sup> Conversely, leaning forward in a sitting position (such as over the back of a chair) can help to relieve back pain

and encourage rotation of a baby in an occiput posterior (back-to-back) position. Standing in a forward leaning position can help fetal head flexion, encourage more productive contractions and increase the urge to push during the second stage.<sup>63</sup>



Figure 5. Poster depicting positions for labour and birth poster<sup>18</sup>

Encouraging women to labour and birth in upright positions that help to increase the pelvic bony dimensions can help to promote natural/normal birth.<sup>64</sup> Displaying a poster that clearly and simply illustrates helpful labour and birth positions (see Figure 5) may encourage women to be more active and try different positions during labour. Similarly, providing equipment in the birth room to support the woman to adopt and maintain upright positions should also be paramount (see *Section 11. Décor, furniture and equipment*).

Birth environment design is increasingly avoiding central placement of a bed, with some researchers suggesting that the bed be removed altogether and replaced by other equipment.<sup>38</sup> In some birthing facilities, beds are retractable into wall cavities (see Figures 23 and 24, Appendix B). Hodnett et al<sup>65</sup> carried out a randomised control trial of an ‘ambient’ room, the design of which did not include a traditional bed (although it could be returned if required). Both women and their care providers rated the ambient room favourably, although some practitioners reported difficulty in providing care to women on the floor mattress. Similarly, Hauck et al<sup>17</sup> reported high levels of maternal satisfaction amongst women who laboured in a ‘Snoezelen’ room, incorporating multisensory environmental therapy, at a Western Australian hospital (Figure 6). Originally developed in the Netherlands in the 1970s, studies of Snoezelen rooms have found benefits amongst chronic pain sufferers, dementia sufferers and critically ill children, as well as with women during labour and birth.<sup>17</sup>

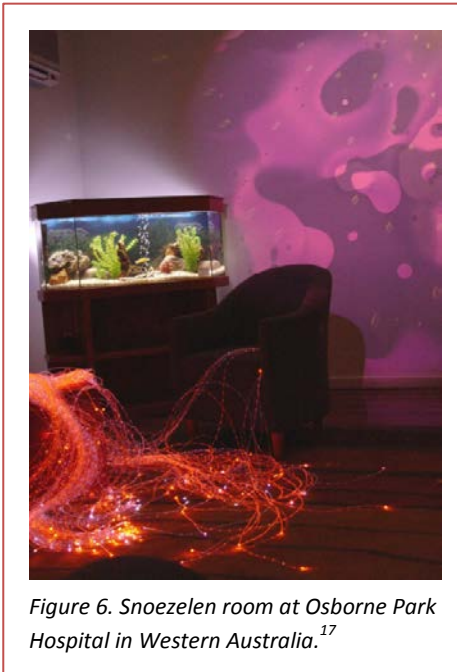


Figure 6. Snoezelen room at Osborne Park Hospital in Western Australia.<sup>17</sup>

Despite the recognised value of reducing the focus on the bed, access to a traditional hospital bed is important should intervention be required. Assisted births (i.e., forceps or vacuum) account for approximately 12% of all births in Australia<sup>66</sup> and some assisted birth clinical guidelines specify that such procedures take place in the lithotomy position.<sup>67, 68</sup> Nonetheless, Walsh<sup>25</sup> cites examples of assisted births being undertaken with the women in upright positions.

### Recommendations:

- A bed should not be the focal point of the room. Alternative furniture and equipment should be provided to encourage women to adopt non-supine positions for labour and birth.
- In some birth rooms (i.e. those designated for women anticipating uncomplicated labour and birth) the bed could be removed entirely. Ready access to a bed should be available if required.
- Portable mattresses and washable beanbags should also be available regardless of the availability and location of the bed.

## 5. Access to water immersion

The purpose of using a bath or pool during labour and birth is to provide the opportunity for women to be immersed in water, either for labour or for birth (see Figure 7). While definitions across the research literature vary regarding water ‘immersion’ and ‘water birth’, the following represents an appropriate definition for the purposes on this document:

*“...providing a depth of water which enables the mother to sit in water that covers her belly completely and comes up to her breast level or kneel in water on her haunches which comes up to just below her breast level. Any amount of water less than this does not constitute true immersion and will not create the buoyancy effect and produce the chemical and hormonal changes which enhance a more rapid labor”.<sup>69</sup>*

Water immersion during the first stage of labour is associated with reduced use of epidural/spinal analgesia and a decreased duration of the first stage of labour, without any increase in instrumental birth rates or adverse neonatal outcomes.<sup>70, 71</sup>

Birthing in water is more controversial amongst clinicians, and is less widely available to women than water immersion during the first stage of labour.<sup>72</sup> A Cochrane review on the topic<sup>70</sup> found no evidence of increased adverse outcomes for either the woman or her baby as a result of water birth. Young and Kruske<sup>72</sup> found that the most commonly cited clinical concerns about water birth were water aspiration, neonatal and maternal infection and neonatal and maternal thermoregulation. Following a review of literature, Young and Kruske<sup>72</sup> concluded that these concerns were not supported by evidence.

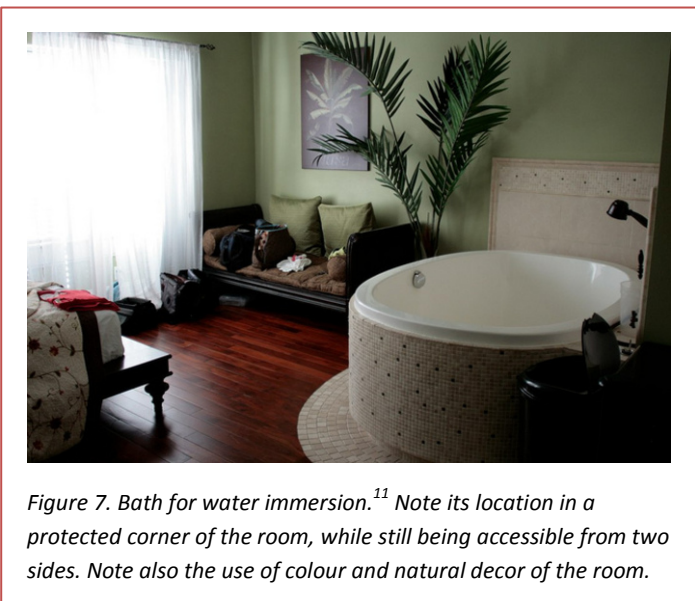


Figure 7. Bath for water immersion.<sup>11</sup> Note its location in a protected corner of the room, while still being accessible from two sides. Note also the use of colour and natural decor of the room.

Research findings about water birth have been favourable, but inconsistent. Dahlen et al<sup>73</sup> found that water birth was associated with better perineal outcomes (when compared to the use of a birth stool), although Cluett and Burns<sup>70</sup> found no significant differences in rates of perineal trauma (when compared to birth out-of-water more generally). Dahlen et al<sup>73</sup> also found reduced rates of postpartum haemorrhage (when compared to birth on a birth stool) and a lower incidence of babies having APGAR scores below 7 at 5 minutes (when compared to babies born to women in a semi-recumbent position).

In light of inconsistent findings about the benefits of water birth, Maude and Foureur<sup>74</sup> argue that the benefits of water birth do not need to be tangible or measurable to understand the value of access to water for labour and birth. Women value access to a birth pool because it provides them with a sense of privacy and a soothing, relaxing and supportive environment.<sup>74</sup> Newburn and Singh<sup>46</sup> found that more than one third (37%) of UK women rated access to a birth pool as 'highly important' and a Cochrane review on the topic<sup>70</sup> found significantly higher rates of maternal satisfaction following water birth, compared to birth out of water. In Queensland, 61.1% of women would have liked to labour in water, but only 13.7% were able to do so, and even fewer were able to birth in water (3.4%). Of those who did access water immersion, the majority (81.6%) perceived it to be helpful for pain relief.<sup>75</sup>



Figure 8: 'Birth pool in a box'.<sup>19</sup> Where permanent plumbed baths are not available, inflatable pools are an alternative.

One Australian state health department has responded to increasing consumer demand by setting targets for increasing women's access to water in labour and birth. NSW Health<sup>76</sup> has set a target for 2015, that all birth facilities in the state will inform women about, and offer access to, water immersion in labour and birth.

#### **Recommendations:**

- *A suitable bath should be present in all birth rooms. Where permanent plumbed baths are not available, inflatable pools should be considered (see Figure 8). The bath must be deep enough to submerge the woman's perineum when she is positioned on all fours.*
- *Baths should be in a protected corner (or separate wet room) where the woman does not feel exposed. For Occupational Health and Safety reasons, baths should ideally be accessible from at least two sides and appropriate non-slip flooring and grab rails should be provided.*
- *Taps and drains should be of sufficient size to allow efficient filling and emptying of the bath.*
- *Staff should have the skills and capacity to remove a woman from the bath, in the unlikely event of maternal collapse. Evidence does not support the installation of*

## 6. Shower

Showers are available in most birth facilities across Australia. Private access to a shower is highly valued by women, with one UK study finding that 43% of women reported that access to an ensuite shower was very important to them during labour.<sup>23, 46</sup> Similarly, a US study found that 78% of women who used the shower as a method of pain relief found it 'somewhat' or 'very' helpful.<sup>78</sup>

Despite such endorsement by women, there is a distinct lack of empirical evidence and practice guidelines informing therapeutic showering.<sup>79</sup> One recent study of labouring women in Taiwan found



Figure 9. Woman using the shower during labour at hospital.<sup>2</sup> She is also using a chair to maintain an upright position.

that women assigned to therapeutic warm showering reported significantly lower pain scores compared to the control group. Showering during labour represents a cost effective, hygienic, easy to use non-pharmacological approach to pain relief that also allows women to actively take part in the labour process.<sup>80</sup>

The release of oxytocin is promoted through sensory stimulation, including touch. Showering, along with immersion in water, can assist in the release of oxytocin.<sup>27</sup> Showers can also create a secluded space within a more expansive birth environment.<sup>22</sup> However, unlike water immersion, showering does not carry additional benefits such as buoyancy that make it easier for women to change positions.

Showers should be large enough for two or more people, allowing the partner and the birth attendant to access the woman. It is useful to have one or two showerheads with hoses to allow water to be directed onto specific areas to ease discomfort<sup>74</sup> as shown in Figure 9.

### Recommendations:

- All birth rooms should include an ensuite bathroom with a shower.
- Showers should be large enough to accommodate the woman, her birth partner and the accoucheur along with a chair, birthing ball or stool.
- Showers should have two showerheads with flexible hoses to allow the woman (or her support person/people) to direct the water flow to desired areas.
- Showers should have rails on the walls for the woman to use as supports
- All wet area floors should be nonslip.

## 7. Ensuite toilet

Access to an ensuite toilet should be standard in all birthing suites as privacy during labour and birth is critical to women (see *Section 3. Privacy*). To support ease of movement and safe access to the woman at all times, the toilet should be located in the ensuite bathroom, not in a separate cubicle.

Labouring women require privacy and have a strong desire to be undisturbed. Shared bathroom facilities or the need to cross corridors to reach bathrooms are inconsistent with both of these needs.<sup>47</sup> Seventy percent of women surveyed in a UK study reported that access to an ensuite toilet was of ‘high importance’ to them, yet 4 in 10 women who gave birth in a hospital or a midwife-led unit alongside a hospital reported not having ‘easy access’ to a toilet during labour.<sup>23, 46</sup> Midwives have also reported frustration with women not having access to such facilities.<sup>37</sup>

Unrestricted access to a toilet may also have clinical significance for women. Acute bladder distension (cause by infrequent voiding or inability to void during and immediately after birth) can have short and long-term effects. During labour, it can interfere with the descent of the fetus, prolonging labour.<sup>25, 81</sup> Immediately after birth, it can increase bleeding by preventing the uterus from contracting down firmly.<sup>81</sup> It can also cause long-term, significant bladder damage, voiding dysfunction and pelvic pain.<sup>82</sup>

### *Recommendations:*

- *All birth rooms must have private access to an ensuite toilet.*
- *The toilet should be in the bathroom, not in a separate room and the bathroom should be big enough to allow entry for a wheelchair, trolley or other emergency equipment if required.*
- *A handrail should be fixed to the wall should support be needed.*
- *All wet area floors should be nonslip.*

## 8. Lighting

Despite recognition of the importance of light in health and wellbeing, lighting in the birth environment has been largely overlooked, both in the research environment and in obstetric and midwifery textbooks.<sup>40</sup> Newburn and Singh<sup>46</sup> reported that more than half (56%) of women placed high importance on being able to control the brightness of the light in their birth room. Stenglin and Foureur<sup>22</sup> also noted that control over light intensity is one of easiest ways to provide women with control over their birth environment. Women using the ‘Snoezelen’ room (see Figure 6 in *Section 4. The bed*) in Hauck et al’s<sup>17</sup> study valued being able to control the lighting and projected light murals.

Careful lighting design can also make the environment feel less clinical.<sup>17, 42, 46</sup> Bright, artificial light stimulates the neocortex,



*Figure 10. Coloured lighting above birth pool in Paulinen Klinik in Wiesbaden Germany.<sup>9</sup>*

provoking the release of adrenalin and inhibiting the physiology of birth.<sup>33</sup> Stenglin and Foureur<sup>22</sup> call for the use of warm incandescent lighting resonant of home, since bright stark fluorescent lighting is hallmark of highly-surveilled clinical environments. Being able to adjust the lighting also provides the opportunity to change the mood. Brighter light can encourage activity and lower lighting can create a more restful mood<sup>47</sup> and greater sense of privacy.<sup>22</sup>

Lighting can be used creatively and thoughtfully to create a calming, and relaxing birth room. Figures 10 and 11 show small multi coloured lights above a birth pool in a German birth centre and ambient wall lights in a birth room in the UK respectively. Projected light displays (such as in a Snoezelen room, see Figure 6) or ceiling lights depicting the night sky may also be a valuable as a therapeutic distraction. The online interactive 'Your Birth Room at the Natural Birth Centre' also demonstrates the impact of lighting changes as well as decor and music.<sup>a</sup>

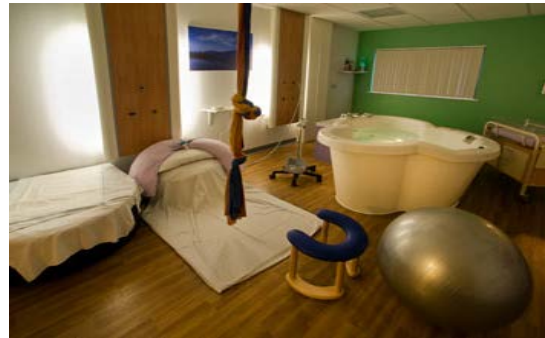


Figure 11. Birth room at West Middlesex University Hospital Natural Birth Centre.<sup>8</sup>

#### **Recommendations:**

- *The woman should determine the light level that makes her most comfortable (except in emergencies).*
- *Bright ceiling lights within the birth room, whilst necessary in certain emergency situations, should not be the only lighting available.*
- *Provide adjustable lighting. Dimmable, 'up-and-down' and walls lights should be available.*
- *Lighting design should contribute to a calming environment.*

## **9. Windows**

Natural light has long been recognised as a significant aid in the healing process<sup>45, 83</sup> as well as being important during the initial stages of the birthing process because it supports the body's natural biorhythms.<sup>42, 47</sup> Considering the benefits of natural light in health environments,<sup>45</sup> it is important that birth rooms have windows<sup>43</sup> (see Figure 12).

The size and placement of the window should protect the occupant's privacy and window coverings should allow light levels within the room to be controlled. Ideally, windows should be operable, as the ability to open and close windows affords the woman some control over the



Figure 12. The 'Wisteria Room' at the New Forest Birth Centre in the UK.<sup>14</sup> Note the windows (with blinds) overlooking a garden. Note also the non-central placement of the bed, and furniture.

<sup>a</sup> [http://www.westmidmaternity.org.uk/wm3\\_c03b.php](http://www.westmidmaternity.org.uk/wm3_c03b.php)

temperature of her birth room, privacy and contact with the outdoors.<sup>31</sup> The provision of a window seat may maximise views of nature and also creates an alcove in the birth room that allows occupants to manage their competing needs for seclusion and togetherness.<sup>31</sup> Shin et al<sup>31</sup> further recommended the use of large windows, but cautioned against floor-to-ceiling windows as these contributed to a loss of the sense of enclosure and security within the space. Similarly, both Shin et al<sup>31</sup> and Stenglin and Foureur<sup>22</sup> found that interior windows (windows between adjacent to internal spaces) undermine the privacy of the birth environment and should therefore be avoided.

#### **Recommendations:**

- *Windows should be large enough to allow natural indirect light to fill the room, while minimising glare.*
- *Adjustable window coverings should be provided to preserve privacy and control light levels.*
- *Windows should be operable, ideally sliding.*
- *Internal windows should be avoided.*
- *Windows should be positioned to allow visual access to natural surroundings.*

## **10. Noise**

Hospitals across the world, including Australia, have noise levels well above established guidelines, including those recommended by the World Health Organisation.<sup>84</sup> Continuous environmental noise appears to be inherent in the hospital environment and can negatively affect memory, cause increased agitation, reduce pain tolerance and increase the use of pharmacological pain relief.<sup>83-86</sup> Sound is interpreted as a reflex action and so external noises are rapidly transmitted to brain where pitch and volume are interpreted as either causing alarm or conveying safety.<sup>22</sup> High levels of ambient noise are stressful for patients, families and staff and have been implicated in clinical errors.<sup>87</sup> In noisy environments, people become less interpersonally engaged, less caring and less reflective, cognition is impeded and people show less perseverance.<sup>83</sup>

The use of noise-absorbing materials should therefore be designed into birth rooms. Dijkstra et al<sup>45</sup> found benefits from interventions aimed at reducing noise in health care environments. Other studies have also found that reducing noise can reduce clinical error rates.<sup>87</sup> Moreover, soundproofing of birth rooms also contributes to privacy. Women need to feel comfortable enough to make noise during labour without the fear of being overheard,<sup>47</sup> nor should they be worried by overhearing the sounds of other women.<sup>42, 47</sup>

While the negative effects of noise on health outcomes in the hospital environment are widely understood, the therapeutic effects of music can be profound and research into this area across all facets of health care is growing.<sup>45, 83</sup> Music has been used as a tool for pain management since the 1980s.<sup>88</sup> Music therapy can help to decrease anxiety and sensations of pain in labouring women through sense distraction and through reducing the woman's concentration on negative stimuli.<sup>89</sup> Similarly, Phumdoung and Good<sup>90</sup> found that listening to music during early labour was associated with significantly lower pain scores and less distress. Music may also be a useful way to block out background noises and enhance the sense of privacy a woman has in her birth room.<sup>85</sup> The inclusion



of recorded natural sounds may also have a calming effect<sup>83</sup> as well as bringing nature into the birth environment (see also *Section 13. Inclusion of nature*).

Women can also use music to prepare for their birth and listen to the same music during labour. Browning<sup>88</sup> found that women who participated in a music therapy program in preparation for birth and during their labour reported that the music enhanced relaxation and helped them pace their breathing and manage pain.

#### **Recommendations:**

- *Birth rooms should incorporate noise-absorbing materials to both contain sounds within the space and exclude external noise.*
- *The capacity to play music (CD players and iPod/MP3 docks) should be incorporated into all birth rooms.*
- *The volume and type of music should be determined by the woman.*
- *Music should be portable so it can be moved with the woman around the room and bathroom.*
- *Headphones may be a useful way to assist the woman focus inwards and block out background noise.*

## **11. Décor, furniture and equipment**

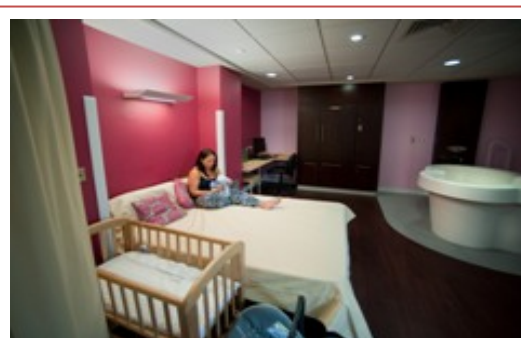
Long before décor was considered by modern science, Florence Nightingale<sup>91</sup> recognised the potential impact of hospital décor on patients. Color, visual focal points including artwork, soft furnishings, fixed furniture and equipment all influence the ambience of a birth space. Overall, a minimalist approach to furnishing is worthwhile given the importance of open space in the birth room<sup>25</sup> (see *Section 12. Ability and space to move around*). The use of retractable beds and concealing emergency equipment in accessible cupboards can both preserve space, as well creating a less medicalised atmosphere (see Appendix B).

### **Colour**

The colour scheme and materials used in a birth environment can play a significant role in shaping mood.<sup>47</sup> Whites and creams should be avoided as they contribute to a stark, clinical feel<sup>22</sup> and bright colours should be avoided as they can stimulate the neocortex. The ideal colours include deep, non-reflective blues, purples, pinks and greens<sup>92</sup> (see Figure 13).

### **Visual focal points**

Décor can also be used to create visual focal points within a birth environment that may provide a positive distraction from pain during labour and can help a woman to focus and shut out the world around her. For example, artworks displayed at Queen Charlotte's Hospital in London were commissioned to symbolise both the intensity and beauty of birth (see Figure 14). The artworks



*Figure 13. Lewisham Birth Centre in the UK. Note the use of deep purples and reds, as well as the lighting and decor.<sup>20</sup>*

were rated highly by women who used using them as visual aids during labour and their popularity has been attributed to the notion that they represent the birthing process.<sup>7</sup>

Aquariums, light projection systems and windows that look out onto a natural scene may also provide similar visual focal points.<sup>47</sup> Aquariums and windows scenes have the additional benefit of bringing nature into the birth environment (see *Section 13. Inclusion of nature*).

### Fixed furniture

Naturally occurring fibres, wood and wood-effect materials are useful in avoiding the clinical, sterile feel of the traditional hospital environment (see Figure 15). The use of these materials may also enhance connections with nature. All surfaces should be smooth and easily washable.<sup>47</sup>

Other fixed furniture can be used to provide physical support to women during labour and birth. Mantelpieces, for example, stand at a convenient height and their shape and strength, can support a woman labouring in upright positions.<sup>47</sup> Ideally, they should be made of a light coloured wood (or wood-effect material) to provide a natural feel.

### Equipment

It is important for the birthing environment to include birthing aids such as a ball, stool and rope (see Figures 16-19) to enable women to choose the tools which are most useful to them as their labour progresses.<sup>93</sup> A range of equipment will support more frequent position changes, which is known to facilitate descent of the fetal head through the birth canal.<sup>63</sup>



Figure 14. An example of the artwork commissioned for Queen Charlotte's Hospital in London.<sup>7</sup>



Figure 15. The Cossham Birth Centre, in Bristol UK.<sup>21</sup> Note the use of wood-effect materials and lighting.

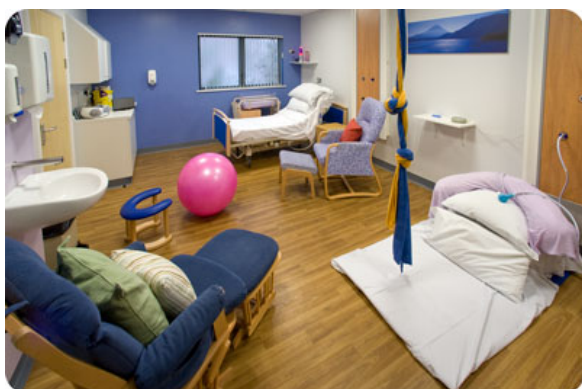


Figure 16. Birth room at Western Middlesex University Hospital.<sup>8</sup> Note the variety of equipment, non-central placement of the bed and use of colour and artwork.

Birthing balls in particular may help a woman both to maintain an upright posture and keep her pelvis mobile. One US study found that 67% of women who had used a birthing ball found it somewhat or very helpful in relieving pain.<sup>78</sup> Figure 17 depicts how a birthing ball, in conjunction with a rope/swing, can be used by a woman in labour.

Birthing stools (see Figure 18) have been used during labour and birth for centuries (see also *Section 2. Background*). They are particularly useful for women who wish to give birth in a

squatting position, helping to overcome muscle fatigue that may accompany squatting for long periods. One systematic review found that the use of birth stools resulted in a lower rate of episiotomy and fewer abnormal fetal heart rate patterns.<sup>55</sup>

Given the importance of support people to women during labour and birth,<sup>94, 95</sup> birth room décor should also provide for their comfort by including furniture such as a chairs and a sofa bed (See also Section 16. Provisions for support people).



Figure 17. Woman using birth ball and rope/swing.<sup>9</sup>



Figure 18. Contemporary birth stool with back support, foot stool and soft matting.<sup>15</sup>

#### **Recommendations:**

- *Deep, non-reflective colours should be used in birth rooms, in preference to whites, creams or bright colours.*
- *Visual focal points should be created within birth rooms.*
- *Natural materials, wood-effect panelling and furniture should be used.*
- *A range of equipment that encourages and supports upright positioning for labour and birth should be available in every birth room, including a birth stool, ball, ropes, and an upright chair.*
- *Fixed furniture (such as a mantelpiece) should be considered to allow for flexibility of use.*

## **12. Ability and space to move around**

Being able to move around freely is very important to women during labour<sup>23</sup> and studies have shown that mobility assists the descent of the fetus through the birth canal and shortens labour.<sup>56</sup> The ability to move around during labour is important in achieving a normal birth<sup>96</sup> and women who are unable to move around their birth environment are more likely to birth by emergency caesarean section.<sup>23</sup> The use of wireless equipment for continual fetal monitoring (if required) can also support the woman's need to maintain mobility.

When able and encouraged to do so, women in labour move around freely,<sup>49</sup> rocking and swivelling instinctively what has been called the “dance of labour”.<sup>25</sup> However, a woman’s desire to move about during labour is influenced by both the physical size and the privacy of a birth room.<sup>25</sup> Shin et al<sup>31</sup> found that the size of the birth room itself can support the perception of privacy.

#### **Recommendations:**

- *Birth rooms should be large enough to:*
  - *allow the woman to walk around and adopt different positions*
  - *accommodate the woman and her support people*
  - *accommodate a range of equipment and furniture options.*
- *Minimise the number of fixed items in the room - flexible use of space is ideal.*
- *Wireless equipment should be made available where continuous monitoring of the fetal heart is required.*

### **13. Inclusion of nature**

Views of, and access to, nature can help reduce stress levels via what Wilson<sup>97</sup> call the ‘Biophilia Hypothesis’ - that is, our innate propensity to gravitate towards life and life-like processes. Wilson contends that “to explore and affiliate with life is a deep and complicated process in mental development. To an extent still undervalued in philosophy and religion, our existence depends on this propensity, our spirit is woven from it, hope rises on its currents”.<sup>97, p1</sup>

Looking out at a natural scene can have significant effects on health outcomes.<sup>45</sup> Ulrich<sup>98</sup> found that patients with a window that looked out on a natural scene took fewer analgesics and had shorter post-operative stays compared to patients whose window looked out onto a brick wall. While providing a window will allow natural light in, realising additional health benefits requires consideration of the quality and accessibility of the view from the window. Windows in rooms that are higher than the second or third floor will only provide a view to the outside if the woman stands by the window. In order for the windows in each room to provide valuable natural views, and for women to be able to take advantage of courtyards and outdoor areas around the birth room, birth rooms should be on the ground floor.<sup>99</sup>

Designing birth rooms to achieve connection with nature brings with it considerable physiological and psychological benefits.<sup>42</sup> The inclusion of natural objects in the birth environment such as fountains, green indoor plants, shells, murals and aquariums can provide a link to nature<sup>47</sup> (see Figure 19).



Figure 19. Birth room in the award winning Birmingham Birth Centre, UK, incorporating a nature mural.<sup>12</sup>

### **Recommendations:**

- *All birth rooms should have at least one window to allow natural light to penetrate the room.*
- *Windows from birth rooms should provide a view of a natural scene outside.*
- *Birth rooms should be decorated with images of nature and décor should incorporate natural objects such as aquariums, plants, fountains etc.*

## **14. Ease of access**

Way-finding difficulties are stressful to people arriving at hospitals, and for women in labour this may be acutely felt. An integrated approach to way-finding should be incorporated into the design maternity facilities, including printed and 'you are here' maps, consistent signage, easily identifiable entry points and a simple route to access birth rooms.<sup>100</sup> Situating birth rooms on the ground floor of a health facility may provide this ease of access for women (who may be in labour) arriving at the facility for birth.

A ground floor location also permits easy access to outdoor areas and natural surrounds. Courtyards can provide a private, calming, natural environment (see Figure 20). As mentioned previously, it is



*Figure 20. Courtyard garden at the Helensville Birth Centre, NZ.<sup>4</sup>*

common for labour to slow upon arrival at a hospital as the change in environment can be stressful, resulting in a rise in adrenaline and subsequent fall in oxytocin production.<sup>30</sup> Providing a peaceful, outdoor space for these women can help them relax which will, in turn, help to restore oxytocin production and a more effective labour process.<sup>47</sup> Walsh<sup>25</sup> suggests that ground floor locations may also provide the labouring woman and her support person with a reassuring 'connectedness' to the earth.

### **Recommendations:**

- *An integrated approach to way-finding should be adopted.*
- *Birth rooms should be located on the ground floor, ensuring easy and close access upon arrival. This will also ensure easy access to open spaces, gardens and courtyards.*

## **15. Odours and olfactory senses**

There is a strong link between emotion and smell, with pleasing aromas having the capacity to lower anxiety and pain perception and unpleasant aromas provoking anxiety, fear and stress.<sup>83</sup> For many, 'that hospital smell' is a source of anxiety.<sup>101</sup> One of easiest ways to overcome the sterile, antiseptic

smell of the hospital environment is to invite women to bring personal items from home, such as a quilt or doona. Not only do these introduce familiar domestic objects, but also the smells of home.<sup>22</sup> Shin et al<sup>31</sup> cite that availability of ambient smells as another benefit of operable windows (see *Section 9. Windows*).

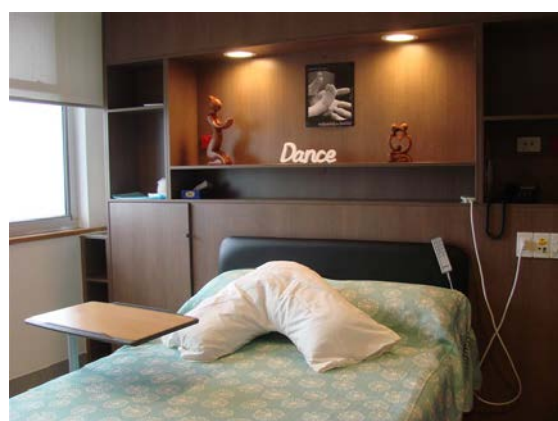
The use of aromatherapy in health care is more controversial. The International Association of Aromatic Medicine and Aromatherapy<sup>102</sup> cautions against the use of aromatherapy during pregnancy, without first consulting an aromatherapist, however Sibbritt et al<sup>103</sup> found that aromatherapy is commonly self-prescribed by pregnant women. A Cochrane review by Smith et al<sup>104</sup> on the use of aromatherapy for pain management in labour found insufficient evidence of benefits, with no differences found in either of the two trials reviewed. However, reduced anxiety has been documented with the use of aromatherapy in other areas of healthcare,<sup>105</sup> including some evidence that it may be particularly effective with women. Some studies,<sup>106-108</sup> including one large study of 8000 women during labour and birth,<sup>109</sup> also found anxiolytic benefits from aromatherapy. Similarly, Burns et al<sup>109, 110</sup> found that aromatherapy reduced women's reported perception of pain during labour, although it did not appear to affect use of pharmacological pain relief.<sup>109</sup> Other studies have also found aromatherapy to be useful in managing intrapartum and post caesarean-section nausea.<sup>109, 111</sup>

#### **Recommendations:**

- *Women should be invited to bring personal items from home, in order to create a familiar homely smell in the birth room.*
- *Birth rooms should have operable windows.*
- *Birth facilities should develop local guidelines to support women wishing to use aromatherapy during labour and birth.*

## **16. Personal items**

One of the reasons women can react negatively to the hospital environment is the sterile, impersonal nature.<sup>31</sup> Encouraging women to personalise their environment may help overcome this



*Figure 21. Inside the "Gardenia Room" at Toowoomba Birth Centre.<sup>16</sup> Note the shelves that women could use to display personal items, and the use of wood-look materials.*

and afford a beneficial sense of control over their physical social surroundings.<sup>25, 112</sup> Several other elements of birth environment design already addressed in this guide include recommendations for women to have control over their environment, such as with respect to privacy, lighting, windows, noise and décor. Shin et al<sup>31</sup> recommend including spaces and surfaces for women to display personally significant items and mementos (see also Figure 21). The ability to personalise the birth environment, allows women to create a 'territory' and enables them to feel safe to pursue a broader range of behaviours.<sup>31</sup>

### **Recommendations:**

- *Encourage women to personalise their birth room, including providing spaces for them to display items of personal significance.*

## **17. Provisions for support people**

Although the focus of much of the literature on birth environment design is, rightly, on the woman, it is also important that birth rooms are comfortable and hospitable for support people.<sup>113</sup> Women who have continuous support during labour and birth have better outcomes, with lower rates of caesarean section and instrumental birth, less use of pharmacological pain relief and greater likelihood of being satisfied with their birth experience. They also have slightly shorter labours, and their babies are less likely to have a low Apgar score at five minutes.<sup>95</sup> Furthermore, Ulrich<sup>112</sup> concludes that healthcare designs should foster social support, since higher levels of social support are associated with less stress and higher levels of wellness.

The aspects of healthcare design valued by health consumers are those that create homely environments that support normal lifestyle and family functioning.<sup>114</sup> The birth room itself must be sufficiently spacious and well-furnished to comfortably accommodate support people. It is valuable to include support people in food and drink provisions, or to provide facilities where they can prepare refreshments, as well as separate but nearby toilet facilities<sup>113</sup> (see Figure 22). Providing double beds and welcoming partners for overnight stays is also valued by women.<sup>115</sup>



*Figure 22. A birth room at the Origine Birth Centre in the Netherlands<sup>1</sup> Note the provisions for support people including bed, seating and tea and coffee facilities. Note also the alcove created for the bath.*

### **Recommendations:**

- *Birth rooms should be sufficiently large and well-furnished to comfortably accommodate support people.*
- *Support people should have access to food and drink, or facilities to prepare refreshments.*
- *A toilet should be provided for support people, separate to, but nearby, the birth environment.*

## 18. Cultural considerations

Although it is important to recognise that all women are individuals who have their own unique needs and wants, there are specific groups whose culturally-specific needs should be considered when designing birth environments. Australia is a culturally diverse country with over a quarter of residents (27%) born overseas.<sup>116</sup> In addition 548,370 people identify as being of Aboriginal and/or Torres Strait Islander origin.<sup>117</sup> Attitudes and beliefs about pregnancy and birth vary between and within cultures.<sup>118</sup> Some Aboriginal women believe that if a child is not welcomed into the world properly by respectfully observing spiritual and cultural practices, then the birthing experience will fail to be a true rite of passage.<sup>51</sup>

Décor in birth spaces, and adjacent areas, can contribute to a welcoming and culturally respectful environment. Artwork can be selected to reflect local cultures.<sup>119</sup> Culturally diverse images of women and babies can be displayed. Signage can be printed in relevant local languages. It is also appropriate to display relevant national flags, including Aboriginal and Torres Strait Islander flags, as well as plaques recognising the traditional owners and country on which the birth facility is located.<sup>120</sup>

Women with specific cultural needs might place particular emphasis on:

- Support for labour and birth in upright positions.<sup>121, 122</sup>
- Access to water immersion for labour and birth.<sup>121</sup>
- Avoiding bathing or showering soon after birth.<sup>118</sup>
- Access to hot water bottles or heaters to replicate the practice of ‘mother-roasting’ after birth.<sup>118</sup>
- Access to nature and open spaces, particularly if she wishes to carry out traditional ceremonies.<sup>123</sup>
- Provisions for support people, including female relatives, other women from their community and sometimes, their male partner.<sup>118, 122</sup>

### **Recommendations:**

- *Consult with local community regarding culturally safe birthing spaces.*
- *Promote and incorporate traditional knowledge and practices by working with key members of community.*
- *Offer culturally specific programs for women where local populations are of suitable size.*
- *Select artwork in consultation with local community members and based on local cultural mix.*
- *Provide access to outdoor spaces and support locally relevant traditional ceremonies.*

## 19. Conclusion

The physical birth environment underpins feelings of safety and satisfaction with labour and birth. Home-like environments, such as birth centres, consistently show improved clinical outcomes for women and babies. Despite this, most contemporary birth suites are clinical spaces, missing many opportunities to create a calming ambience that supports the physiology of labour and birth.



This guide has examined evidence about the importance of each element of birth space design, including privacy; the bed; access to immersion in water; shower and ensuite toilet; lighting; windows; noise; décor, furniture and equipment; ability and space to move around; inclusion of nature; olfactory aspects; personal items; provisions for support people and cultural considerations. While this guide has clear relevance to those interested in the design of new birth spaces, the recommendations offered may also guide relatively straightforward and low cost changes to existing birth environments. With considered implementation, the evidence-based design recommendations in this guide may contribute to enhancing the outcomes and birth experiences of women in all birthing settings.

## Appendix A: The BUDSET

The BUDSET is a tool developed by researchers from the University of Technology Sydney to assess the optimality of birthing environments.<sup>47</sup> This tool can assist in determining what aspects of the environment might be contributing to issues such as uterine inertia and fetal distress.<sup>47</sup> Following a literature review, interviews with key informants, and consultation with an expert panel who met over a 2-year period, design principles and characteristics were identified and a thematic analysis was then carried out. This led to the emergence of four key domains, each consisting of between two and eight measurable characteristics (see Table 1).

When using the tool to assess a birthing environment, each characteristic is marked as either present or absent and total scores for each domain are calculated, followed by a total weighted score for facility. As shown in Table 1, many of the characteristics in the BUDSET<sup>b</sup> have been identified in this guide as key elements in creating an optimum birthing space.

A later study measuring the content validity of the BUDSET determined that the tool effectively measures the 'optimality' of birth environments.<sup>124</sup>

**Table 1. BUDSET Domains and Characteristics**

Domain	Characteristic
<b>1. Fear Cascade</b>	Space – Arrival Space – Outside Space – Reception Space – Birthing rooms Sense of domesticity Privacy Noise control Universal precautions
<b>2. Facility</b>	Physical support Birthing bath En suite bathroom facilities
<b>3. Aesthetics</b>	Light Colour Texture Indoor environment/airflow/smell Feminine symbols
<b>4. Support</b>	Food and drink for woman Accommodation for companions and birth attendants

<sup>b</sup> <http://www.nmh.uts.edu.au/cmcfh/research/budset.pdf>

## Appendix B: Labour and delivery room at St Mary's Hospital, London

The midwife-led birth centre at St Mary's Hospital in London opened on 4<sup>th</sup> June 2008, following four years of planning. Rooms within the centre, shown in Figure 23 and 24, were carefully designed to facilitate physiological birth for women with low risk pregnancies.<sup>6</sup>

As shown in the images below, the rooms include many of the important aspects referred to in this document:

- Ambient down-lights fitted to the wall
- Wood-effect walls to reflect nature and induce a feeling of calm
- Retractable double bed stored away in the wall cavity
- All medical equipment hidden in cupboards and drawers out of sight of the occupants, but still easily accessible
- Large birthing bath available in wet room
- Numerous birth aids including a bean bag, birthing ball and stool, rope suspended from the ceiling and large contoured cushion
- Windows to allow plenty of natural light
- Blinds at large windows should the occupant wish to use them
- Bright, natural, earthy colours



Figure 23. Midwife-led birth centre at St Mary's Hospital in London.<sup>6</sup>



Figure 24. Midwife-led birth centre at St Mary's Hospital in London with bed and resuscitation bay revealed from wall cavities.<sup>6</sup>

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