Chapter focus

The purpose of this chapter is to provide the reader with an overview of the use of water immersion for labour and birth. It will track the history and development of the use of water immersion for labour and birth over the last two decades, review some of the most recent literature that informs practice while exploring physiology, potential problems and issues related to practice. We have included women’s perspectives of their experiences of using water for labour and birth. Finally, some recommendations for the safe use of water immersion in labour and water birth are provided.
The key principles of a midwifery model of care that underpin this chapter are:

• The belief that pregnancy and childbirth is a normal life event for most women;
• Midwifery care is woman-centred;
• Continuity of care throughout the entire childbearing experience.
• The woman-midwife relationship is a partnership based on:
  • A trust and reciprocity and a respect for the expertise of both the woman and the midwife
  • The woman’s personal knowledge of her health history being considered equally as important as that of the midwife
• Both partners having equal status and shared meaning through mutual understanding.
• Knowledge and power are shared between the partners

Objectives

After reading this chapter the reader will be able to:

  • Describe some of the history around the practice of using water for labour and birth
• Understand and integrate the literature that informs safe evidence based care for women using water for labour and birth
• Demonstrate an understanding of the principles and guidelines related to the practice of using water for labour and birth
• Support the use of water for labour and birth as a means of enabling midwives to be 'with women' and supporting physiological birth.

Key Terms
Water immersion for labour and birth, physiological birth, women’s satisfaction with their birth experience, relaxing effect, decreased anxiety, reduction in women’s pain perception, women feel more in control, partnership, continuity of caregiver.

Introduction
From the early 1980’s, when water immersion during labour and birth was used predominantly by women birthing at home, many questions have been asked about efficacy and safety for both the woman and the baby. Globally women, midwives, doctors and researchers have attempted to answer these questions and the enquiry
continues. The use of water immersion in labour and the phenomenon of water birthing have close association with the act of **physiological birth** widely supported by women and midwives throughout many countries. However, controversy between professionals has surrounded its use with much debate around the perceived benefits and potential risks.

**The role of water immersion and water birth in supporting physiological birth**

As midwives, we are increasingly searching for the best available evidence to challenge and change many of the practices in obstetrics that are ‘routine’ and/or based on the risk management processes of institutions and some maternity care providers. Midwives recognise that practice wisdom comes from many sources and use evidence from scientific inquiry and from the shared stories that have informed our practice over time. We need to validate the advice we give to women by exploring and sharing the research findings and practice wisdom in order to facilitate the woman and her family to make informed decisions about their care, based on this information. Women are entitled to receive thorough, unbiased information about choices for
care, place of birth and caregiver, so that they can make informed decisions about their care.

Women know that they should avoid all drugs and harmful substances during their pregnancies, yet the protocols for active management of labour subject them to a range of drugs and practices that often start a cascade of intervention, resulting in operative delivery. Wagner (cited in Hall & Holloway, 1998, p.31) suggests that, “Many midwives and the women in their care are becoming advocates of more natural forms of childbirth and demand care that is sensitive to the psychological needs of the individual and her family”.

The option to use water is one way of supporting women in labour without drugs, along with continuity of caregiver and the availability of private and peaceful surroundings in which to labour and birth. The demand for water immersion in labour and waterbirth has grown rapidly throughout the world over the last two and a half decades. Hall & Holloway (1998) suggest this may be one reaction against medical control of childbirth. This is supported by Kitzinger (1995), who says that the use of warm water also seeks to change the dynamics of the care of labouring and birthing women, to give control back to them.
She says warm water immersion and waterbirth are not just another ‘trendy’ technique but rather an approach to childbirth that enables the birthing woman to have autonomy, by changing the environment and the quality of interactions between all those involved in the care.

The history of water immersion and water birth

The first documented birth in water was reported in a French medical journal in 1805, when a woman exhausted after a forty eight hour labour, climbed into a warm bath to relax, giving birth to her child into the water shortly afterwards (Church, 1989, cited in Richmond, 2003). The following one hundred and fifty years saw water birth rarely being broached in the medical literature. Igor Tjarkovsky, the Russian water birth enthusiast, generated a lot of interest in this method of birth in the sixties. Tjarkovsky created this interest both within his own country and around the world through claims that birth in water improved the psychic abilities of the baby (Zimmerman 1993 cited in Richmond 2003). There are no data however to support this theory.
In 1975, Leboyer’s book, *Birth Without Violence*, described the use of water as a healing therapy for babies. His work was based on the idea of birth having a profound effect on the future development of the baby and stressed the need for peace, quiet and gentleness at the time of birth. Leboyer proposed the use of water immediately after birth as a gentle introduction for the baby, minimising harsh stimuli such as light and sound.

During the seventies in France, Dr Michel Odent observed that women were attracted to the use of the shower or bath when in labour. As with most practitioners new to waterbirth, Odent’s initial experience was with a woman so completely relaxed in the bath that the baby was born before she was able to get out (Lichy and Herzberg, 1993). After that first experience he began to offer waterbirth to all women who had long labours. In 1983, Odent published in the Lancet the summary of the outcomes of one hundred water births at his alternative-birthing unit in Pithiviers, France. Odent’s article was one of the first major medical publications dealing with birth in water. While Tjarkovsky was concerned with the baby and its development, Dr Odent was more concerned with the labouring woman.
Following on from the work of Tjarkovsky, Leboyer and Odent, the practice of labouring and birthing in water gathered momentum in the eighties within the homebirth community and the practice of independent (domiciliary) midwives. With the emergence of a spiritual movement that supported the notion of the dolphin and human connection and rebirthing, there was an increased demand for ‘water babies’ (Sidenbladh, 1983). Inspired by enthusiastic women and midwives, labouring and birthing in water spread into Birth Centres and hospital maternity units in the nineties. The growing popularity is largely attributable to the women and families who have experienced the benefits of birthing this way.

The first water births in New Zealand and Australia

The first of the modern water births in New Zealand, believed to be the first in the Southern Hemisphere, occurred at Estelle Myer’s Rainbow Dolphin Centre in Tutukaka in the north of the North Island on 17th March 1982. The baby’s mother had read an article on water birth and the underwater birth experiments of Igor Tjarkovsky. She drove her house bus and three children up to Tutukaka intent on birthing in water. Estelle, friends, a midwife and a nurse attended the woman during her birth. The baby, weighing 3.6 kgs was born in the
bath, in a posterior position (her second persistently posterior baby) after two and a half-hours of labour. Similarly a few years later in 1985 Estelle supported a Russian woman who birthed her son into water in Sydney. There were six midwives present to observe this new practice and hence the waterbirth movement in Australia was born!

To date, in New Zealand there is no national data is available as to water birth rates and how women utilise pools and baths during labour and birth. Individual practice or facility audits report a 65% - 75% pool use in labour (Banks, 1998; Cassie, 2002) and a 25% - 38% water birth rate (Fenton, 2004; Banks, 1998). In New Zealand, Wanganui Hospital's maternity unit led the country by openly using water immersion for birth. The first documented waterbirth at Wanganui occurred in November 1989. Over a period of 9 1/2 yrs from July 1991 to Dec 2000 there were 916 waterbirths in the maternity unit (Young, 2001).

Similarly there is generally a lack of published data in Australia around the use of water for labour and birth, which is not indicative of its widespread usage. Labouring in water and births in water have been occurring at planned homebirths attended by homebirth
midwives since the early 1980’s (Lecky-Thompson, 1989) and within hospital based Birth Centres in Sydney and Melbourne since the early nineties (Page,1994 and Caplice, 1995). Currently the hospital facility audits report a waterbirth rate of 35% - 44% of total births at the Royal Hospital for Women in Sydney which represents a steady increase since the inception of the practice in 1992. In addition Australian Independent midwives report a waterbirth rate of around 60%- 80% of total births (Caplice 2004)

Using Water for Labour and Birth: The Evidence

The review of literature revealed research that documented the history and development of the use of water for labour and birth and also a progression of thinking and sophistication, which was based on the outcomes of the research. When looking at the research that has been done on the use of water for labour and birth it is important to understand the methodology and methods used in the research. This is because research is weighted according to the traditional hierarchy of evidence. The hierarchy of evidence is a standard notation for the relative weight carried by different types of study when decisions are made about the effectiveness of clinical interventions. The
randomised-controlled trial (RCT) is considered to be the ‘gold standard’ and represents the only true means of evaluating the effectiveness of an intervention (in this case, water immersion) in terms of improving outcomes such as operative delivery or exogenous pain relief.

Qualitative studies using techniques such as a grounded theory approach, phenomenology or narrative inquiry are not placed high in the traditional hierarchy of evidence. There are important and valid studies of the use of water for labour and birth that use qualitative methodologies that should be considered alongside the studies employing quantitative methodologies. It should be understood that quantitative designs attempt to answer questions as to ‘what works’, which is a result that can be measured. Qualitative designs attempt to explore 'what is going on', ‘how does it work’, 'how can we understand the factors that impact on people' and ‘how do individuals feel and behave they way they do’.

The Cochrane Database of Systematic Reviews (February, 2004) updated reports on eight trials (2939 women) examining the effects of water immersion during labour. The only trial included that researched
birth in water was too small to determine outcomes for women and babies, so was not included. Neither does it include any studies into the third stage of labour in water. The reviewers concluded that there was a statistically significant reduction in women’s pain perception and the rate of epidural analgesia is reduced which suggests that water immersion during the first stage of labour is beneficial to some women.

There was no evidence that the benefits were associated with adverse outcomes for babies or longer labours. To date there is insufficient evidence about the use of water immersion during second stage to enable the formation of firm conclusions about the safety and effectiveness giving birth in water. Water immersion during the first stage of labour can be supported for low risk women (Cluett, E.R., Nikodem, V.C., McCandlish, R.E. & Burns, E.E., 2004).

To date there are no significant or multi-centred randomised-controlled trials comparing birth in water with land birth even though numerous authors have called for such rigorous testing. A commonly held belief has been that the ethical considerations of a randomised controlled trial for water birth make the prospect of such a study
unlikely (Woodward and Kelly 2004). However, a recent pilot study conducted by Woodward and Kelly (2004) to assess the feasibility of a randomised controlled trial and the willingness of women to participate in such a trial has produced some positive results. The study proves women are willing to enrol in a randomised controlled trial comparing waterbirth with land birth and that randomisation does not necessarily affect women’s satisfaction with their birth experience. This research paves the way for the organization of a multicentred, randomised controlled trial to evaluate the differences between land and waterbirths with large enough numbers to produce statistical significance.

In the meantime however, there is some good quality descriptive research that gives us information to consider. This review will attempt to provide an overview of the current debates about birthing in water. The majority of studies reviewed refer to the use of water immersion in labour rather than water immersion during birth unless otherwise specified.
Physiological effects of water immersion during labour and birth

The calming and relaxing effect that water immersion achieves during labour and birth is well recognised. The relaxing effect of warm water immersion and how it may facilitate women to birth without exogenous pain relief and other forms of interventions was first described by Odent (1983). Church (1989) also proposed that water immersion decreases anxiety in the woman and that this works to reduce adrenaline levels, thus encouraging natural oxytocins and endorphins to flow uninhibited. A natural balance of pain and relaxation is achieved, and labour progresses normally.

Cammu et. al (1994), found that there was no statistical difference between the absolute values of labour pain between the two groups of women in their trial. They reported that bathing provided no objective pain relief. It had, however a temporal pain stabilizing effect, possibly mediated through the improved ability to relax in between contractions. This was supported in the historical cohort study by Aird et al. (1997 WHO) found that labouring in water allowed greater relaxation of the mother during the first stage of labour thereby allowing her to reach the second stage better prepared to give birth without assistance. The pain relief effect of warm water immersion is
probably associated with a reduced level of endorphins and catecholamines, “there is a tendency to fall asleep in a comfortable tub”, (Odent, 1997, p. 415). The explanation for this effect is related to the 'soothing warmth', 'the support of the body' and the 'pleasurable sensation' of water, the effect of which stimulates the closing of the gate for pain at the level of the dorsal horn, and supports the notion that water provides women with temporal stabilising effect possibly mediated through the improved ability to relax in between contractions (Cammu , 1994).

The hydrothermic effect relates to the conduction of heat though the warm water through the skin leading to peripheral vasodilation. The resultant release of muscle spasm contributes to the reduction in pain (Brown, cited in Richmond 2003a). The hydrokinetic effect refers to the feeling of weightlessness often described by women (Deschennes, 1990). The combined effect of warmth and weightlessness contributes to women feeling more relaxed and less anxious (Ginesi, 1998). The vasodilation of the peripheral blood vessels and the redistribution of blood flow when women are immersed in warm water during labour have been observed to contribute to a reduction in blood pressure (Church, 1989 and Nightingale, 1993). A common concern has been
that vasodilation and relaxation of uterine muscles might lead to an increased possibility of postpartum haemorrhage. However, numerous audits in units that use immersion in water for labour and birth do not support this (Garland, 1994, Rosenthal, 1991, Caplice, 2004). It would seem that the natural processes already in place in the body are sufficient to counteract this theoretical problem (Richmond, 2003a).

**What women say about water immersion during labour and birth**

When reviewing the qualitative research on birthing in water, strong themes emerge. These include that:

- **Women feel more in control.** Water reduces their anxiety around pain and the process of childbirth itself.
- Women report that they use water to cope with pain, not necessarily to remove or diminish it
- Women feel more relaxed and the water promoted their comfort
- Women feel sheltered and protected in the water, which promotes privacy
- Women are able to move around more easily and feel supported by the water

(Hall and Holloway 1998, Richmond, 2003 and Maude, 2003)
Stories of women's experience of using water for labour and birth have broadened our understanding of the meaning they make of the experience, and have demonstrated that the efficacy of water immersion goes beyond measurable outcomes. Being in water during labour and birth is not the end product; it's not the water itself that makes a difference. It is a shared philosophy and a shared belief in birth as a normal life event that supports women to use water. It is also the planning, the preparation, the education and the anticipation of using water for labour and birth, supported by safe and judicious use, that creates an environment that promotes relaxation, privacy and a release that enables and empowers women to maintain control. It appears it is not necessary for women to actually give birth in the water to achieve these benefits (Maude, 2003).

**Safety and Efficacy of using water for labour and birth**

Today water immersion during labour and water birth is widely practised globally by practitioners who employ a holistic approach to birth and support women to birth physiologically. Whilst most health professionals involved in the care of women during pregnancy and birth now agree there is adequate evidence to support labouring in
water there continues to be tension between health professionals around safety, particularly of birth underwater. This next section will examine the literature around some these issues.

**Water Temperature**

The temperature of water used in labour and for birth has caused concern in relation to fetal outcomes. In the late 1980s, this concern focussed on the potential dangers of temperatures below 37°C, with a suggestion that low temperatures may stimulate the baby to breathe (Lecky-Thompson, 1989; Lenstrup et al, 1987; Gradert et al, 1987). Subsequently, attendants erred on the side of caution, maintaining pool temperatures at levels around 37-38 degrees Celsius. However, in 1994, maternal hyperthermia became an issue when two babies were born with perinatal asphyxia after the mothers were immersed in water for some hours during labour as it was thought that the temperature of the water had been a contributing factor (Rosser, 1994). This assumption was never proved.

Johnson (1996) explains that as the baseline fetal temperature is normally 0.5-1°C above maternal temperature, the fetus is placed at
risk when the mother experiences hyperthermia. The fetal oxygen demands increase making the baby susceptible to fetal distress. In response to this information, guidelines have been set to reduce the risk of birth asphyxia in water and the recommended temperature of the water is no higher than 37.5°C, which is normal body temperature (Deans and Steer, 1995; Duley, 2001; Richmond, 2003). In contrast Charles’ (1998) paper on fetal hyperthermia explains that a maternal temperature rise of up to 1 degree Celsius may be beneficial to the baby as there is an increase in oxygen transfer across the placenta; however, this research does not define temperature thresholds that might be considered too hot.

Geissbuehler et al (2002) measured maternal and neonatal temperatures of women who birthed in water and compared them with those of women and babies who birthed on land. The authors concluded that birth in water did not pose a thermal risk to either mother or baby. Furthermore, they assumed that women self-regulate their body temperature according to changes in the water temperature and that this mechanism of self regulation of core body temperature would be far superior to any water temperature guideline. There is no reason for practitioners to adhere to protocols that recommend
keeping the water at a set temperature, other than the mother’s physical comfort. More recently, in support of Geissbuehler’s proposition, Tricia Anderson (2004) suggests that practitioners give up their obsession with the temperature of the water, throw the thermometer away and instead focus their attention on ensuring that the woman has control over her environment and on facilitating her comfort. It would seem therefore more appropriate to check the woman’s temperature before she enters the pool and during the time that she is in the pool, while regularly checking in with her about the temperature of the water. It is useful to also have supplies of cool water or ice chips and access to a fan.

**Immersion and Duration of Labour**

Studies investigating a reduction in the duration of labour in relation to water immersion have been inconclusive. In 1994, Garland and Jones analysed data from 209 primiparous women and 220 multiparous women and demonstrated a median and mean reduction in labour length but since then, other studies have been unable to replicate these findings. Schorn, Mcallister and Blanco’s (1993) prospective randomised controlled trial of the use of warm water immersion by 93 women could not demonstrate a shortening of
labour; however, the immersion was only for an average of 30-45 minutes. Other retrospective comparative studies show small decreases in length of labour. More recently, Cluett et al (2004) in their randomised control trial comparing water immersion with standard management for labour dystocia, reported water immersion as being of benefit, but the mean duration of labour was similar in both groups.

**Use of Analgesia in Labour**

Being immersed in water does not necessarily take the pain away. What it does appear to do, and this is supported in the literature, is to provide a release from the pain in the form of warming, soothing, comforting and relaxing. For women who want to avoid pharmacological pain relief and for midwives who support these women, judicious use of water immersion may offer the means to achieve this. One historical cohort study of the effects of immersion in warm water during labour found the requirement for both pethidine and epidural analgesia was significantly reduced amongst women having their first baby (Aird et.al., 1997). The Cochrane review (2004) reports that there is evidence that water immersion during the first stage of labour reduces the use of analgesia and reported maternal
pain, without adverse outcomes on labour duration, operative delivery or neonatal outcomes.

Most maternity care providers and facilities accept that the use of water immersion during labour significantly reduces pain. However, recent research suggests the role of the birthing pool may be even more important than care providers realise. Cluett et al (2004), from Southampton Hospital in England, have discovered that women, with labour dystocia, who use water immersion during the first stage of labour are less likely to need analgesia or an operative delivery. The research compared women who used water immersion during labour with those who had standard augmentation for dystocia and demonstrated that the women who used the birthing pool had significantly fewer epidurals, needed less assistance with giving birth and had fewer obstetric interventions.

The women in a study by Taha (2000), also reported less pain when using water immersion in labour. Two qualitative studies on women’s experiences of water immersion report that in addition to the pain relieving effects of water, the therapeutic qualities of water facilitated
the women to cope better with the pain of labour and birth (Richmond 2003 and Maude 2003).

**Perineal Trauma**

Consistently the findings regarding perineal trauma associated with birth in water show a higher intact rate in the waterbirth group and a higher rate of sustained perineal trauma in the land birth group (Burke and Kilfoyle, 1995, Aird, 1997, Geissbuehler & Eberhard, 2000). The most startling evidence is the reduction in episiotomy rates, demonstrating the protective aspect of water birth against intervention. In Geissbuehler and Eberhard,’s (2000) study the episiotomy rate in the waterbirth group was 12.8% compared with 35.4% in the land birth group. One could argue however, that there is no place for episiotomy in the practice of waterbirth because if you are performing an episiotomy out of concern for the condition of the baby then you should not be continuing with a birth in water!

**Risk of Infection**

The theoretical risk of infection to either the woman or her baby has often been put forward as an argument against the use of water for labour and birth particularly for women with ruptured membranes.
Waldenstrom & Nilsson (1992) conducted a non-randomised controlled study at the Stockholm Birth Centre comparing women who used the bath after ruptured membranes with women who had ruptured membranes but did not use the bath. The authors concluded there was no statistically significant difference between the groups with regard to infection, infant respiratory problems or symptoms of amnionitis in the mother. More recently, Robertson et al (1998) conducted a medical review, which examined the association between the use of water immersion in labour and the development of chorioamnionitis and endometritis and found there was no significant association. Similarly Geissbuhler and Eberhard (2000) analysed 7508 births and reported no statistically significant difference in infection rates between infants born in water and those born on land.

Michel Odent (2001) discussed bacteriological colonisation of babies at birth. He explained the concept of the “race to the surface” used by bacteriologists, meaning the first bacteria to reach a bacteria free surface will be the likely rulers of the territory. Babies are born sharing the IgG antibodies of their mothers therefore it is beneficial for a baby to be colonised by its mother’s bacteria. From a microbiological perspective, it would seem that birth in water is a
positive action, in line with skin-to-skin contact. It is when babies come in contact with unfamiliar bacteria from caregivers and hospitals that the bacteria they colonise become potentially dangerous. This theory supports the idea that caregivers should stay out of the water unless absolutely necessary, but partners and siblings should not be discouraged as they are likely to have similar bacteria colonisations to the mother.

The literature indicates that if pools/baths are adequately cleaned there is no increase in neonatal or maternal infection (Global Maternal /Child Health 2000, cited in Harper 2000). Infection risks to babies appear to be primarily caused by gram negative organisms that colonise in pump systems of spa baths, filling and draining hoses, and inadequate bath cleaning procedures (Vochem, 2001).

The issue of blood borne viruses such as HIV, Hepatitis B and C was discussed at the First International Waterbirth Conference in London in 1995. It was concluded that the water diluted such viruses to the point that they became impotent and posed much less of a threat than blood splashes that may occur in a land birth (Beech, 1996). In researching the risk of work related HIV exposure or infection to
midwives in attending waterbirths, Colombo et. al (2000) took pool water samples from 14 different waterbirths and measured the haemoglobin content to estimate the viral load the liquid would be carrying. The authors concluded that due to the diluting effect of the water, the potential risk for HIV-exposure to intact skin was minimal and unlikely to have consequences. However, in their opinion a risk for nosocomial Hep B infection is significantly higher and they recommend wearing gauntlet gloves and ensuring all health care workers are vaccinated.

**Third Stage and Blood Loss**

There have been no documented cases of complications in relation to the third stage being conducted in the bath. In 1983, Odent proposed a theory that water embolism could be a risk factor. This has now largely been dismissed, with Odent himself withdrawing the hypothesis, admitting it was unfounded and a mythical concept.

Richmond (2003) hypothesises that there is an increased potential of postpartum haemorrhage associated with water birth. Her rationale for this is based on the hyperaemia induced by warm water and the relaxing effect it has on uterine muscles. However in the many audits
in units practising water birth this has not proved to be a problem (Garland 1994, Caplice 2004).

**Effects on the baby of birth underwater**

Johnson (1996) describes in depth the physiology of fetal breathing in utero and the main factors that contribute to inhibit breathing in the newborn until s/he is lifted into air. Fetal breaths in utero are intermittent isometric movements with very little inspiration of amniotic fluid. Approximately 24-48 hours prior to birth, in response to the increase in prostaglandin E2 levels from the placenta, the fetal breathing movements slow down or cease. This decrease in fetal breathing movements allows more blood flow to the vital organs, including the brain. At birth when the prostaglandin level is still high, the baby’s breathing response is still slow, thus instigating the first inhibitory response.

A second inhibitory response is related to acute hypoxia in the newborn. Babies are born experiencing a lack of oxygen in response to the birth process. This normal inhibition of breathing may be overridden if the baby becomes compromised in utero. Acute hypoxia
causes apnoea and swallowing but if severe and prolonged, it will cause breathing and gasping (Fewell and Johnson, 1983).

Another important inhibitory component is the ‘dive reflex’. Central to the physiology of the dive reflex is the larynx, which is covered with chemoreceptors (like taste buds). With application of foreign stimuli such as water to the larynx, these chemoreceptors initiate the glottis to close so that the water is swallowed and not inhaled (Harding et. al 1978). Johnson (1996) reports that whilst substances such as water, non species milks, isotonic alkalis and ammonia initiate the full diving response physiological saline, amniotic fluid, lung and gastric fluids, urine, blood, meconium and milk from the same species at body temperature illicit little response when instilled to the larynx.

The last main factor that is thought to inhibit the newborn from initiating a breathing response whilst in water is environmental temperature. Johnson (1996) reports that the fetus is co-dependent on maternal temperature control and with the fetal core temperature 0.5 – 1 C above the mother’s, there are important implications for practice. Maternal hyperthermia and the resultant hyperthermia in the fetus may override the inhibition to breathe. Therefore it is advisable that
strategies are in place to avoid maternal hyperthermia or overheating. However, the issue of keeping the water at maternal body temperature and no less to maintain the inhibitory affect needs to be reconsidered in the light of births taking place in oceans where the babies are reported to be born with no adverse effects (Harper 2002).

**Perinatal Mortality and Morbidity/ Adverse Outcomes**

An extensive survey in England and Wales was conducted to research the extent to which women were labouring or giving birth in water. In addition, the survey assessed the problems reported following births in water (Alderdice et al 1995). Of the 4834 births in water from 1992-1993 it was reported that there were six stillbirths/neonatal deaths, none of which could be attributed to the use of water. The estimated mortality rate was 1.24 per 1000 live births. Women giving birth in water are generally perceived as low risk, therefore this figure needs to be viewed accordingly.

In 1999 Gilbert and Tookey compared the perinatal morbidity and mortality rates for babies born in water with babies born on land in the British Isles, England and Wales. The key message from this study was that perinatal mortality and risk of admission to special care baby
units is similar for babies delivered in water and for low risk deliveries that do not take place in water (Gilbert & Tookey, 1999).

**Polycythaemia**

In 1997, an isolated case of neonatal polycythaemia following a birth in water was reported in the Lancet. The labour and birth were uneventful and the mother remained in the water for thirty minutes following the birth. There was a delay in clamping and cutting of the cord for a further ten minutes. At two days of age, the baby was diagnosed as severely polycythaemic and an exchange transfusion performed. The baby developed normally and the interpretation was that the warm water prevented the normal vasoconstriction of the cord when exposed to air (Austin et al 1997). As an isolated case the implications for practice are minimal.

**Cord snapping**

Gilbert and Tookey’s (1999) surveillance study and postal survey of perinatal mortality and morbidity among babies born in water identified that delivery in water may have contributed to snapped umbilical cords in five babies (out of a total of 4032 births in water). One of the five babies required a blood transfusion. The snapped cords
were probably the result of cord traction when bringing the baby to the surface rapidly.

Cro and Preston (2002) report on an audit conducted following an instance of cord snapping at a waterbirth. They identified four cases of snapped umbilical cord out of 100 water births between September 1996 and March 2001. In three instances the cord was noted to have snapped while bringing the baby to the surface and the ends were immediately clamped with no adverse effects for the babies. In the fourth case, the snapped cord was discovered when it was noted that the baby was becoming paler and making reduced respiratory effort. A lot of blood was noted in the water. The baby required a blood transfusion and was discharged from hospital after 3 days. Follow-up at eight weeks found the baby to be developing normally.

There is no way of knowing how many umbilical cords snap during birth underwater nor indeed is there any research on cord snapping during birth in air. Some authors have suggested lowering the level of the water just prior to second stage; however this is not thought to be wise as it decrease the advantages of water immersion (comfort, buoyancy, hydrostatic pressure and freedom of movement). Ensuring
that the baby is born completely underwater can only be assured when
the water is higher enough to ensure the woman's comfort (at the level
of the breasts while sitting). It is prudent that midwives supporting
women to birth in water should be aware and prepared for this rare
event. It is recommended that the baby should be brought to the
surface slowly to avoid undue traction on the cord. The midwife is
advised to check the cord as soon as possible after birth.

**Neonatal resuscitation**

A randomised controlled trial in Australia comparing outcomes of
women who used water immersion during the first stage with those
that did not, concluded primarily that there was no reduction in the use
of pharmacological pain relief for the water immersion group. Their
secondary finding was that the babies in the water immersion group
required more resuscitation than those in the control group, which is
an unexpected finding particularly when the trial did not include any
actual births in water (Eckert et al 2001). This publication caused
some clinicians and services to rethink the practice of water
immersion in labour. The flaws in the research however, limit its
reliability and clinical applicability. The length of time that some
women spent in the bath (from 5-360 minutes) causes the reader to
question the motivation of the midwives to the practice of immersion in water. It is an unreal expectation to believe that five minutes in the bath would have any analgesic effect or significant effects on the baby.

The high number of women who ‘crossed over’ from their allocated group is a concern. This high crossover level may have directed the groups to have similar outcomes because the intervention essentially became the same. Furthermore, it is difficult to see how some of the outcomes could be convincingly linked to the intervention, i.e. being allocated to a room with a bath.

Another concern with this study identified by Homer (2004) is the choice of analysis and the conclusions reported. In spite of stating at the outset that the neonatal outcomes studied would be clinical and laboratory signs of infection; antibiotic use; and nursery care; the authors use resuscitation at birth as a significant outcome. Resuscitation at birth is considered a ‘soft’ outcome that is directly related to the experience of the attending clinicians and their individual assessment of the baby’s condition. In addition, the type of resuscitation utilised in the study was described as waving oxygen.
around the baby’s face, a practice which one could argue might be
directly related to practitioner anxiety with regard to the use of water
immersion.

**Potential near drowning**

More recently Nguyen, Kuschel, Teele and Spooner (2002), reported
in Pediatrics, four cases of babies admitted to the neonatal unit
following birth in water at other hospitals and at home. Theses babies
presented to hospital with moderate to severe respiratory distress and
were reported to have water aspiration and subsequent pulmonary
oedema. With clinical support all the babies improved over a 24 hour
period. This article highlights a concern for potential near drowning
associated with birth in water and the authors call for all waterbirths to
be prospectively audited

Similarly Bowden, Kessler, Pinette and Wilson (2002), report in
Pediatrics, on four admissions to neonatal intensive care unit after
birth in water. The first case was suspected to have water inhalation;
however his discharge diagnosis was respiratory distress syndrome.
The second baby developed seizures at 8 hours of age and his
discharge diagnosis was probable water intoxication after birth in
water. The third baby had a congenital abnormality diagnosed on day two. The fourth baby was admitted at 4 days of age with Group B streptococcal meningitis not directly attributable to birth in water.

In response to the concerns raised by their paediatric colleagues regarding the effects of birth in water on the neonate, Pinette, Wax and Wilson (2004), conducted a retrospective review of the literature regarding possible complications associated with birth in water. They identified 16 citations that reported on complications with neonates that could be attributed to birth in water. The possible complications included freshwater drowning, neonatal hyponatraemia, hypoxic ischaemic encephalopathy, and death. The authors however go on to include that the rates of these complications are likely to be low.

Conclusions about adverse outcomes need to be considered in relation to the small sample sizes of all the trials reviewed. Women contemplating birth in water need to know the possibility of adverse effects on the baby in order to make an informed decision. However due to the lack of sufficient data the evidence for attributable risk associated with water birth is unclear. The literature informs us that
there are occasional poor outcomes that may be associated with birth in water.

There is a continuing call to research birth in water and to monitor the outcomes for both mother and baby. All maternity facilities, birthing units and independent practitioners offering water immersion and birth should be collecting prospective outcome data. In light of Woodward and Kelly’s (2004) pilot study, it seems that a multi-centred RCT comparing birth in water with birth on land is now more feasible.

**Using Water for labour and birth: The Practice**

Women and midwives have used water for labour and birth at home births for decades. At home women use their domestic bath, portable birth pools and sometimes inflatable paddling pools bought especially for the purpose. Home birth women actively seek to avoid any intervention into their birth process and are largely very well informed and knowledgeable about the benefits of using water for labour and birth. Home birth midwives have explored, with women, the means to birth physiologically. The use of water is one method used to achieve this. To this end, home birth midwives generally have become knowledgeable and experienced in water immersion and water birth.
Globally, and not just at home births, there has been an increase in the number of women seeking to use water for labour and birth. In response to the increasing demand from women and midwives it has become more common to find water immersion facilities in maternity units at all levels. This is an attempt by institutions to provide a home-like environment that supports a more holistic approach to birth. Hodnett, 2000, has found that women who were allocated to care in home-like settings were less likely to use pharmacological pain relief measures during labour, less likely to have labour augmented with oxytocin, less likely to be immobile during labour, less likely to have fetal heart abnormalities, and were happier with their care, than women who received standard care. Hospitals and birth units have spa baths/ birth pools that vary widely in size, shape, depth, place and position in the birth room.

Ideally, women will have antenatal preparation and education regarding, amongst other things, the use of water for labour and birth. This education is best provided by the midwife who provides care throughout pregnancy, labour and birth and postnatally. Continuity of

caregiver supports informed decision-making. However, not all midwives are able to practice as the lead maternity carer, enabling continuity of care and the formulation of a midwifery partnership. This places greater challenges on the midwife, especially in the maternity facility where the midwife may not have met the woman until she is in labour, to ensure that women who she recommends water to are fully informed of all the possibilities.

In the studies reviewed, women had made an informed decision to use water immersion for labour and birth. They were therefore highly motivated to labour without pain relief and medical intervention. Furthermore, the presence of a midwife throughout the labour and birth potentially affects the research, given that constant support of a female companion has been shown by a large number of studies to decrease both the length of labour and the need for pain relief (Hodnett, 2003).

Subsequently, one needs to ask whether the women in the studies had such straightforward labours because of this constant companionship and the environment rather than any benefits associated with water, or was it a combination of the all of these components. In addition, most
of the studies do not give any clear indication of the attitudes of the midwifery staff towards the use of water immersion during labour and birth. This will surely impact on the outcome for women. Midwives who are unfamiliar or opposed to water immersion for labour and birth may become more sensitive about potential problems and are therefore more likely to use resuscitation and initiate unnecessary interventions such as directing the woman to leave the water. Midwives need to be educated in how to support women during labour and birth in water, as well as having the opportunity to witness water labour and birth before they attend one and to have ongoing professional development.

**Guidelines and Principles for the Use of Water for labour and Birth**

The principles that underpin midwifery practice are the belief that pregnancy and childbirth are normal life events for most women; that midwifery care is woman-centred and continuity of care is desirable throughout the entire childbearing experience. These philosophies provide midwives with the opportunity to support physiological birth. One of the strategies used by midwives, in support of physiological birth, is the use of water during labour and birth. Midwives recognise
that warm water immersion changes the dynamics of labour and birth and empowers women, in most instances to, birth without intervention.

While guidelines will vary in each location, there are general principles that can be drawn from the literature regarding the benefits and considerations of using water for labour and birth.

**Benefits of Labour and Birth in Water**

**Woman**

- Warm water cradles, supports, relaxes comforts and soothes, thereby reducing anxiety.
- Enables instinctive behaviour and increases the feeling of being in control, which in turn leads to a high degree of postnatal well-being
- Less operative delivery and perineal trauma
- Provides buoyancy and increased mobility, reduces pressure on muscles and vena cava – reduced BP
- Reduces the need for pharmacological pain relief
- Provides a protected secure birthing space
Baby

- Reduced maternal need of pharmacological pain relief – reduces side effects on baby
- Theoretical idea that the first breath for baby is gentle as the air above the water is warm and humidified
- Theoretical assumption of a smooth trauma free transitory passage for baby

Midwife

- The increasingly rare opportunity to witness and facilitate physiological birth
- The develop and enhance the fundamental skill of working in partnership with women
- To extend their knowledge base and to participate in research into the use of water for labour and birth

Important Considerations for Attending Labour and Birth in Water

- The birthing family’s attitude and expectations. Education regarding the use of water for labour and birth is important antenatally to prepare women and their families. A woman’s fear/anxiety about birthing in water is a contraindication
• The midwives’ attitudes, experience and confidence in supporting women to use water for labour and birth. Women who labour and birth in water should expect practitioners that are appropriately skilled

Who can use water for labour and birth?
Because each woman is an individual and her pregnancy unique, her care should be individually negotiated by a known midwife. The midwife uses wise clinical judgement as to the suitability of using water for each woman. Many maternity facilities have developed water immersion and water birth criteria that is too prescriptive, inhibits autonomous midwifery practice and is more to do with facility risk management than what women want.

Criteria
• Low risk pregnancy > 36 week (no adverse factors noted in maternal or fetal well-being during pregnancy or labour)
• The woman’s choice to use water for labour and birth
• Established labour
• There should be no specific requirement for continuous fetal heart rate monitoring

Some reasons why it may NOT be advisable for a woman to use the birth pool include:

• Maternal temperature > 37.5 celsius,
• Thick meconium staining of liquor and
• Recent use of a systemic opioid for analgesia.

• Most practitioners consider breech presentations and multiple pregnancies unsuitable for underwater birth, however there is anecdotal evidence that these do occasionally occur both in hospitals and at home.

Equipment

• Purpose built birthing pool, portable birth pool, spa bath or inflatable paddling pool with firm sides
• A continuous supply of hot and cold water (temperature can be maintained by immersion heater or continuous supply of temperature regulated water)
• Adequate supply of dry linen, especially towels
• Sieve - for keeping water as free of faecal contamination as possible
• Light source – eg., waterproof torch or headlamp

• Mirror

• Protective clothing (personal choice or according to hospital guidelines)

• Plastic waterproof support pillow or a rolled up towel for head or arm support

• Portable delivery pack, oxygen and suction, oxytocics

• Waterproof doppler and a pinnards

• Portable nitrous oxide / entonox as appropriate though generally not at a home birth

• Foot stool

• Fan

• Bed or mattress nearby


Occupational Health and Safety

• Back care
  
  - midwife awareness

• Protective clothing
  
  - long latex gauntlet gloves

  - knee pads or low stool

  - plastic aprons
• Infection control

- hoses and jets in the pool are not recommended, however when hoses are required for filling pools, especially at home births, two different colour hoses, one for filling and one for emptying pools must be used

  - an agreed policy for cleaning the birth pool (and hoses), chlorine agents are most effective against HIV, Hep B and C

  - Non slip flooring/mats in pool

  - Electrical equipment kept away from “wet” areas

  - Adequate room ventilation

  - Promote the safety and wellbeing of all, particularly any children

Care of Woman and Baby during Labour

• Advise and assist the woman to wait until she is in active labour before entering the pool

• The water in the pool should be filled to the level of the woman’s chest whilst she is sitting in the pool

• Maintain the water temperature according to the woman’s comfort

• Routine labour observations and FHR recording
• Encourage the woman to drink as desired whilst in the water
• As much as possible keep faecal contamination of the water to a minimum
• Encourage the woman to explore different positions in the pool

**Care of Woman And Baby During a Birth In Water**

• The woman should not be left alone when in water and during the second stage the midwife should remain in the room.
• Attend to routine second stage observations
• Encourage physiological pushing

  Physiological or non-directed pushing is less likely to tire the woman and her baby (Paine, LL. And Tinker, DD. 1992).

• A ‘hands off” technique by the midwife is advised when appropriate, supported by verbal guidance

  A hands off technique keeps the tactile stimulation to a minimum (Johnson, P. 1996).

• The practice of checking for nuchal cord is to be avoided

  In most cases the nuchal cord can be loosened and disentangled as the baby is born (Burns, E. and Kitzinger, S. 2000).
• The baby should be born completely under the water and brought gently to the surface being careful to minimise unnecessary cord traction.

In the surveillance study reported by Gilbert and Tookey (1999) the incidence of five snapped cords highlights the importance of minimizing traction on the cord during birth. If the cord is short then the woman is instructed and assisted to stand out of or above the water to receive her baby.

• Following the birth do not allow the baby’s head to resubmerge.

It is important to communicate to the woman the need for the baby’s head to remain above the water once born and for the midwife to ensure that whilst in the woman’s arms the baby does not inadvertently slip back into the water.

• Routine observations and apgar score on baby.

Experienced waterbirth practitioners observe that the babies born in water appear more relaxed and quiet at birth which may affect the one minute apgar score.

• Maintain baby’s temperature by using a woollen bonnet and keeping the baby’s body under the warm water.

Need to maintain a neutral thermal zone for the baby and minimise oxygen consumption by reducing heat loss. Babies
lose a lot of heat from their heads. Replace wet blankets with warm dry ones as needed

• Conduct a physiological third stage

A physiological third stage, where the cord is left unclamped until the placenta and membranes are born, is encouraged wherever possible. Active management may be used if indicated. When a midwife is judicious in conducting a physiological third stage there is no increase in post partum haemorrhage. There is no evidence to suggest that third stage must be conducted out of the water. (Burns, E. and Kitzinger, S. 2000, Levy, V. 1990).

• The woman is assisted from the pool to a nearby couch or bed, as required, when she is ready

• Ensure the baby’s warmth by drying thoroughly and maintaining skin to skin contact with the woman, as appropriate

Complications

The midwife’s use of wise clinical judgement is of paramount importance

As with all aspects of care during pregnancy, labour and birth, there is
an expectation that the midwife will have discussed the full range of possibilities and actions with the woman in her care. A woman who is fully informed will trust the midwife’s judgment and immediately heed her advice to leave the water if there are any concerns for her safety or that of the baby. It is important for midwives to acknowledge that “uneasy” feeling they may have even though it does not appear clinically justified. Experienced midwives often describe acting on intuition that on reflection was very predictive of outcome. Be honest with the woman regarding your feelings….she may be feeling the same!

• Fetal distress - FHR irregularity/abnormality

Where there is any non reassuring fetal heart rate the midwife should advise the woman to birth out of the water (Johnson,P. 1996)

• Grade II meconium staining

Grade I meconium is considered normal. The woman is requested to leave the water if time permits and she is able when > Grade I meconium is present. If she is unable to exit the water in time continue with the birth and suction the baby’s airways when the baby’s head is above the water. Thick meconium is the most ominous sign and
requires the woman to exit the water immediately (Enkin, M., Keirse, M., Neilson, J., Crowther, C., Duley, L., Hodnett, E. and Hofmeyer, J. 2000)

• Slow progress in labour (any stage)
Sometimes the water has the effect of slowing the labour down. Often simply assisting the woman from the water will remedy this situation. (Eriksson, M., Mattsson, L.A., and Ladfors, L., 1997) Ask the woman to have some time out of the water (advising her to the toilet to pass urine is useful) thereby allowing gravity to help contractions to re-establish. Going back into the water is still an option.

• Use of narcotic analgesia
Women who have used a systemic opioid for pain relief in labour need to be carefully assessed due to the sedating effect of the medication on her and her baby.

• Tight nuchal cord
In the rare event that the cord needs to be cut the mother is asked to stand out of the water. The cord must not be cut and clamped underwater (Burns, E. and Kitzinger, S. 2000).
Maternal hyperthermia
Maternal hyperthermia may lead to the overriding of the baby’s normal inhibition to breathe (Johnson, P. 1996).

Episiotomy
The most common indication for episiotomy is fetal distress therefore one could argue that there is no place for it in the practice of waterbirth because if the midwife is worried about the wellbeing of the baby the mother should be assisted out of the water to birth on land (Cluett, ER., Nikodem VC, McCandlish, RE., and Burns, EE. 2004a).

Shoulder dystocia
Shoulder dystocia is considered an obstetric or midwifery emergency. When shoulder dystocia is diagnosed the woman is assisted to stand up and place her leg on the side of the pool (this encourages hyperflexion of the leg as in the McRoberts manoeuvre). The over stimulation from the manipulation of the baby may initiate respirations or fetal distress in the baby and subsequent gasping
underwater. Often the act of changing position alone dislodges the shoulders.

• Postpartum haemorrhage
Blood loss is assessed as >500mls or <500mls due to the difficulty of accurate estimates in water. A useful guide is how dark the water is getting and whether you can still assess the skin colour of the woman’s thighs. It is wise to assist the woman out of the water sooner rather than later when her condition may be compromised (Harper, B. 2000).

Conclusion
History and over two decades of research and literature have informed midwives’ practice around the use of water for labour and birth. From the most recent Cochrane Database systematic review of immersion in water in pregnancy, labour and birth, the reviewers have concluded that there is evidence that water immersion during the first stage of labour reduces the use of analgesia and reported maternal pain, without adverse outcomes on labour duration, operative delivery or neonatal outcomes. Water immersion during the first stage of labour

Generally, there is a lack of published data in Australia and New Zealand around the use of water for labour and birth, however this is not indicative of its widespread usage. To date there is insufficient evidence about the use of water immersion during second stage to enable the formation of firm conclusions about the safety and effectiveness of giving birth in water and researchers and practitioners have made the call for further research and prospective auditing.

In response to the increasing demand from women and midwives, it has become more common to find water immersion facilities in maternity units at all. This is an attempt by institutions to provide a home-like environment that supports a more holistic approach to birth. Women report that the use of warm water changes the dynamics of labouring and birthing and gives control back to them. Women also report that being immersed in water does not necessarily take the pain away. What it does appear to do, and this is supported in the literature, is to provide a release from the pain in the form of
warming, soothing, comforting and relaxing. For women who want to avoid pharmacological pain relief and for midwives who support these women, judicious use of water immersion may offer the means to achieve this

For midwives, the option to use water is one way of supporting women to birth physiologically and to experience the skill of being 'with woman'

**Review Exercises**

1. What are the key principles of a midwifery model of care that supports women to use water for labour and birth?

2. What do women like about using water for labour and birth?

3. The Cochrane Database of Systematic Reviews, updated February, 2004, reports on eight trials (2939 women) examining the effects of water immersion during labour. What conclusions did the reviewers reach?

4. What are the main mechanisms that inhibit breathing in utero to prevent the inhalation of water during a waterbirth?
5. What is the current thinking about the recommended temperature of the water during labour and birth?

6. Who can use water for labour and birth? When is it NOT advisable?

Critical Thinking Exercise 1

*Kiri is expecting her first baby. She is very healthy and carefully monitors her nutrition, exercise and rest. She is very keen to avoid any interventions into the normal process of labour and birth and especially wants to avoid pharmacological pain relief. What information can you give to her about the use of water for labour and birth to help her to make an informed decision?*

Critical Thinking Exercise 2

*Sally has just given birth to the head of her baby underwater in the bath when you notice signs that you may be confronted with a shoulder dystocia. Describe some of the signs of a shoulder dystocia and your management of the situation when a woman is in the bath/pool.*
Further Reading

Balaskas, Janet, 2004 The Water Birth Book, Unwin Hyman Ltd, UK.
Garland, D. 2000 Waterbirth – An Attitude to Care, books for Midwives Press, UK.

Videos


On-line Resources

www.infochoice.org (Midirs leaflets for professionals and women)
www.gentlebirth.org/archives/watrbrth.html
www.sheilakitzinger.com/WaterBirth.htm
www.waterbirth.org Barbara Harper
References


Cluett, ER., Pickering, RM., Getleffe, K. et al. (2004). Randomised controlled trial of labouring in water compared…


Increasingly women want to find ways to manage the pain of labour naturally, thereby reducing the likelihood of requiring pharmacological pain relief, but are unsure about their ability to go through a labour without some help, especially those women having their first baby. "I didn’t want to use drugs if I could help it but then I’m such a ‘wuss’ when it comes to pain" (Linda in Maude, 2003). Women and midwives have come to see water immersion as a means of achieving this. These women are encouraged to use other methods to promote comfort and support until labour is established and they are able to get into the pool. Being with the woman, supporting and encouraging her through the sometimes-difficult transition phase and honouring her choices has meant that many nulliparous women are able to birth without interventions in the pool.
Page 9  Figure 3 – Clinical interest text box – First waterbirths in Australia and New Zealand
There is little early documented evidence of the practice of waterbirthing amongst the indigenous women of Australia, although Odent (1990) says that some aboriginal women on the western coast of Australia first paddled in the sea then gave birth on the beach. There are stories of traditional birthing practices amongst the Maori of New Zealand where water was used. It was common for babies to be born on beaches in the Te Kaha area (Binney & Chaplin, 1986; Irwin & Ramsden, 1995) and Makereti records the use of water to facilitate birth of the whenua (placenta) when it was delayed (Makereti, 1986).

Page 15  Figure 4 – Clinical interest text box - Women’s perceptions of pain
Much of the research to date has attempted to quantify the absolute effect of pain relief afforded to the woman by water immersion during labour and birth. Women in trials have been asked to rank their level of pain using a visual analogue scale. The prospective randomised controlled trial by Cammu and colleagues (1994) found that there was no statistical difference between the absolute values of labour pain between the two groups of women in their trial. They reported that bathing provided no objective pain relief. It had, however, a temporal pain stabilizing effect, possibly mediated through the improved ability to relax in between contractions.

Women’s stories of their experiences of using water for labour and birth indicate that they do not necessarily use water to take the pain of labour away. Instead they see water immersion as helping them to cope with pain, and to reduce their fear of pain and of childbirth itself (Maude, 2003). A woman in water may remain fearful and scared, but is presented with the ability to relax in between contractions to an extent that her labour may progress more rapidly. Relaxation enables women who use water to focus internally on what is happening to them, their body and their baby.
Figure 5 Clinical interest text box – Relaxation and the effects of water immersion

Labouring in water may allow greater relaxation of the mother during the first stage of labour allowing her to reach the second stage better prepared to deliver the fetus by her own. "I almost fell asleep in between [contractions]. I just let my head loll on the side. I would just lie(sic) it against the side of the bath and I'd just about could (sic) go to sleep. I was so relaxed in between, it was really nice and it was nice to keep warm" (Marion, in Maude, 2003). Odent (1983), claims to have observed that water seems to help labouring women reach a certain state of consciousness where they become indifferent to what is going on around them. Odent continues to explore the biochemical and physiological effects of warm water immersion and concludes, "when a parturient enters a bath at body temperature, there is immediate pain relief. This pain relief is probably associated with a reduced level of endorphins and catecholamines (there is a tendency to fall asleep in a comfortable tub)" (Odent, 1997, p. 415). The explanation for this effect is related to the 'soothing warmth', 'the support of the body' and the 'pleasurable sensation' of water, the effect of which stimulates the closing of the gate for pain at the level of the dorsal horn, and supports the notion that water provides women with temporal stabilising effect possibly mediated through the improved ability to relax in between contractions (Cammu , 1994).

Figure 6 - Photo of woman relaxing in water
Women are highly satisfied with using water for labour and birth
- Women feel more in control of the process of birth which ultimately leads to a more positive experience
- Outcomes and risks are similar for low risk women who labour and birth in water compared with those who labour and birth in air
- There is a need to continue to audit the practice in combination with comments on experiences from women and midwives. Research into the effects on the baby of birth underwater are recommended
- Research evidence should continue to inform practice
Figure 9 Clinical interest box – Continuous support in labour

Research supports the need for a continuous supportive presence with women during labour. This by itself has been shown to reduce the likelihood of medication for pain relief, a caesarean section or a forceps delivery. For the women in this study, to be able to labour and birth in water meant that they were required to form a relationship with a midwife who was philosophically in tune with them and would support their choices. There is a need for partnership and teamwork between women and midwives.