

# Waterbirth

## Guidelines for the use of water for labour and birth

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Revised October 2004

**This guideline is intended for use by all midwifery staff involved in the care of women choosing to labour and/or give birth in water. This guideline applies to all low risk birth settings.**

## **Introduction:**

Nationally, 0.6% of births include birth in water or the use of immersion in water during labour<sup>40</sup>. Although immersion in water during labour compared to conventional care has not been shown to reduce the caesarean section rate other significant benefits have been reported. These include:

Randomised controlled trials <sup>1</sup>:

- Reduced need of pharmacological analgesia

Non-randomised studies <sup>2,3,4,5,6</sup>:

- More intact perineums in nullips
- Fewer episiotomies
- Overall incidence of perineal trauma less
- Reduction in analgesia
- Shorter overall labour

Qualitative studies <sup>5,7,8,9</sup>:

- Women experienced greater sense of control
- Excellent experience
- Would choose the same again

University Hospitals of Leicester NHS Trust have had waterbirth facilities since 1991 and latest figures show that UHL numbers are significantly higher than the national average of 0.6%: 46% at St Mary's Birth Centre, 5% (of all births) at Leicester General Hospital and 2% (of all births) at Leicester Royal Infirmary (2003). These figures are also steadily increasing as more women choose to labour or give birth in water.

These guidelines for the use of water for labour and birth have been produced by an expert Working Party to collate the best available evidence on waterbirths in order to provide midwives with a reference point to inform their practice.

Recommendation		Grade of evidence
1.	Suitability for a waterbirth should be assessed in consultation with the woman.	IIIA
2.	The pool should be entered when labour is established.	IIIA
3.	The water temperature should be monitored, and maintained at a range of 35-37°C.	IIIA
4.	There are certain points specific to the “mechanics” of birth in water of which the midwife should be aware.	IIIA
5.	Women who have experienced an uncomplicated second stage should be able to choose a physiological third stage as an option. Where active management of the third stage is considered women should be requested to stand clear of the water or to leave the pool.	IIIA
6.	The midwife attending the birth should be aware of several documented cases of cord rupture and water aspiration in water birth, and recognise this as a potential risk.	IIIA
7.	Midwives should be aware of the infection control implications when facilitating a waterbirth.	IIIA
8.	Staff caring for women labouring / giving birth in water should be aware of the manual handling implications for the woman and themselves.	IIIA

#### Evidence Grading:

- I** Well designed RCTs, meta analyses or systematic reviews
- II** Well designed cohort or case-control studies
- III** Uncontrolled studies or consensus

- A** The Working Party feels this element of care should be strongly recommended
- B** A recommendation rated moderately Important by the Working Party
- C** Rated relatively unimportant by the Working Party

## **Recommendation One**

Suitability for a waterbirth should be assessed in consultation with the woman

### **Inclusion criteria for waterbirth <sup>10,11</sup>:**

- Term pregnancy (37-42 weeks)
- Spontaneous established labour
- Uncomplicated pregnancy suitable for Midwifery Led Care in Labour

### **Other reassuring factors**

Women experiencing water immersion and/or waterbirth are <sup>15,16</sup>:

- Guaranteed one-to-one care and all it's accruing benefits
- Midwife-led care and it's benefits

## Recommendation Two

The pool should be entered when labour is well established

There has been debate concerning the most appropriate time to enter the pool during the first stage of labour. The central issues appear to be as follows:

1. Pool immersion in early labour may slow down the progress of labour to such an extent that augmentation is required. Literature is unclear as to what constitutes early labour and parity comparisons do not appear to have been made.
2. Late immersion may lead to a proportion of women having to undergo extra vaginal examinations and being denied the use of water immersion if they have not reached a specific level of cervical dilation.

**Although there has been debate about the most appropriate time for the woman to enter the pool <sup>20</sup>, the working party understands that these are arbitrary figures and recommends that this should be when labour is established.**

Odent has suggested that immersion in water has a potential effect on the relationship between the natriuretic peptid system and the activity of the posterior pituitary gland. <sup>17</sup>

Epstein indicates that the primary effect of water immersion facilitates blood volume expansion, which in turn leads to the release of oxytocin. <sup>18</sup> The secondary follow on effect from this leads to the reduction in posterior pituitary activity.

Odent argues that it is these physiological mechanisms which support the argument against early immersion as after two hours there has been an observed a decrease in uterine activity.

Anderson further supports the argument against early immersion by suggesting that early warm water immersion does appear to lead to a longer first stage. <sup>19</sup>

In contrast to this Garland and Jones have suggested that cervical dilatation at the time of immersion may not be the only significant predictor for the duration of labour. <sup>21</sup> Midwives should remain sensitive to the individual differences between labouring women when discussing options concerning when to enter the pool.

Brown has noted that if women are asked to leave the pool if labour seems to have slowed down, then re immersion can occur when contractions build up again. <sup>3</sup> It has been suggested that labouring in water under midwifery led care may be an option for slow progress in labour <sup>43</sup>.

### **Recommendation Three**

The water temperature should be monitored, and maintained at a range of 35-37°C

Due to the theoretical risk of fetal hyperthermia when warm water immersion is used during labour, water temperature should be carefully regulated. It should be maintained as cool as is comfortable for the woman in the first stage of labour, and increased to no more than 37°C for the birth.<sup>22</sup>

The antepartum and intrapartum events that lead to hypoxic ischaemic encephalopathy are uncertain, and research as to the effects of warm water immersion is contradictory and confined to animal studies. Therefore, the suggestion that warm water immersion may limit heat loss, affect fetal thermoregulation and cerebral blood flow, and increase oxygen requirements is theoretical.<sup>23</sup>

Consequently, the temperatures recommended are arbitrary<sup>44</sup>, based on the assumption that it is wise to maintain the water temperature at or below blood temperature in order to avoid the theoretical risk of fetal hyperthermia. This takes into account the fact that the fetal temperature is at least 0.5°C higher than the mothers during pregnancy.<sup>24</sup>

**In order to ensure that the recommended temperature is maintained the midwife assisting the birth should:**

- Record the water temperature hourly
- Record maternal temperature and pulse four hourly.

**If the maternal temperature rises more than 1°C above the baseline, the water should be cooled, or the woman encouraged to leave the bath until her temperature reverts to normal.**<sup>22</sup>

If a woman is using immersion in a bath for the analgesic effect in labour, maternal and water temperature should be monitored in the same way, regardless of whether or not she intends giving birth in water.

In addition, the usual observations of low risk women in labour would also apply (as stated in the UHL Guidelines for Midwifery Led Care in Labour).

## Recommendation Four

There are certain points specific to the “mechanics” of birth in water that of which the midwife should be aware.

These recommendations are adapted from the book, “Waterbirth Unplugged”<sup>25</sup>

1. First stage sometimes passes more quickly. Observe mother’s body language for signs of progress.
2. Routine observations monitoring and documentation of fetal and maternal parameters as you would any other labour (see UHL Guidelines for Intrapartum Fetal Monitoring). Use waterproof Doppler for monitoring fetal heart.
3. Encourage woman to leave the pool to empty her bladder at regular intervals. Encourage frequent drinks so that the woman remains hydrated.
4. Vaginal Examination should be performed out of the water and should include full assessment.
5. “Hands off” approach is recommended. It is not usual to feel for cord – the baby will be born spontaneously.
6. Gently guide the baby to the surface face first. Avoid undue traction on the cord.
7. If there is lack of descent/advance of head ask woman to stand out of water.
8. If the baby’s head is delivered out of water **do not** let woman re-immerses herself until the baby is clear of the water.
9. If delay with shoulders i.e. shoulders not delivered after one contraction - woman should stand up.
10. If you need to clamp and cut the cord for any reason the baby’s face must be out of the water when this is done.

11. If evidence of:

Concerns about progress of labour	}	Ask woman to get out of pool.
Request for epidural analgesia	}	
Vaginal bleeding	}	
Maternal pyrexia on more than 2 occasions	}	
Maternal hypertension >140/90mmHg	}	
Meconium stained liquor	}	
Fetal heart rate irregularities	}	
Undiagnosed malpresentation	}	
Cord prolapse	}	
Shoulder dystocia	}	
ANY concerns about maternal or fetal wellbeing	}	<b>Transfer to Combined Care.</b>

12. If there is:

Maternal request for opioid analgesia	→	Ask woman to get out of the pool and continue low risk midwifery care in other low risk environment (unless transfer criteria exist).
Heavy contamination of pool	→	
Technical difficulties with the pool	→	

## **Recommendation Five**

Women who have experienced an uncomplicated second stage should be able to choose a physiological third stage as an option. Where active management of the third stage is considered women should be requested to stand clear of the water or to leave the pool.

The World Health Organization (2000) has challenged the indiscriminate use of active management of the third stage for women experiencing normal birth.<sup>26</sup> Women who have had a water birth fall into the criteria of normal birth and should be able to choose a physiological third stage as an option following their birth.

There is evidence to suggest that women may bleed more following a physiological third stage<sup>27</sup> However there is also evidence to suggest that where women are appropriately selected for expectant management of the third stage there is no increase in the risk of post partum haemorrhage.<sup>28,29</sup>

Women who request or are recommended to have an active third stage should be asked to stand clear of the water or to leave the pool. Consensus of opinion regarding this issue would appear to indicate that there may be a health and safety risk with an active management of third stage conducted in the pool.

There is no conclusive evidence currently available to ask women to leave the pool for a physiological third stage. Consensus of opinion of those involved in waterbirth suggests that this should be based entirely on the choice of the woman and the clinical judgement of the midwife.<sup>30</sup>

## **Recommendation Six**

The midwife attending the birth should be aware of several documented cases of cord rupture and water aspiration in water birth, and recognise this as a potential risk.

### ***Cord rupture:***

In a study of 4032 water births in England and Wales, Gilbert and Tookey reported five cases of ruptured umbilical cords.<sup>11</sup> Unfortunately there are no published data for direct comparison with the risk of this complication in conventional deliveries.

A case where a ruptured umbilical cord went unrecognised, with serious consequences, was attributed to impaired visual control when guiding a water birth<sup>39</sup>. The ruptured cord was hanging in the turbid water, and was only noticed when the baby was removed from the water to be resuscitated.

The aetiology of cord snapping is unknown. Gilbert and Tookey suggested that bringing babies immediately to the surface of the water results in rapid cord traction over a longer distance than is the case for a conventional birth. They advocate lowering the level of water prior to delivery to avoid traction. De Graaf argues that this decreases the advantages of giving birth in water, and recommends immediate and thorough investigation of the baby and cord<sup>39</sup>.

Cord rupture in water births is a rare but potentially fatal complication. The Working Party feels that it is sufficient to increase awareness of cord rupture as a potential problem, and encourage immediate and thorough investigation of the cord following birth<sup>46</sup>.

### ***Water aspiration at birth:***

Although there have been 2 cases of confirmed water aspiration following birth in water<sup>11</sup> and a further 4 possible cases reported from New Zealand<sup>45</sup> guidance published by the National Institute for Clinical Excellence<sup>40</sup> concluded that women who choose to labour and deliver in water have no difference in the perinatal mortality rate compared with women who choose conventional care.

For this reason the Working Party feel that there is insufficient evidence to advise eligible women against labour and birth in water. Midwives should remain vigilant in their care of the newborn and refer any deviations from normal to a neonatologist.

## Recommendation Seven

Staff caring for women labouring/giving birth in water should be aware of the manual handling implications for the woman and themselves

It is essential that before entering the pool, ensure that the woman meets the clinical criteria as stated in recommendation one.

These criteria have been developed not only to ensure that the appropriate client group can use the birth pool, but also to ensure that the risk of a woman becoming unable to remove herself from the pool in the event of an emergency is minimised.

Good practice to minimise the risk of manual handling injuries:

- Complete a manual handling risk assessment chart before the woman enters the pool.
- Avoid any unnecessary manual handling whilst the woman is in the pool.
- Aim for a 'hands off' technique to avoid bending over the pool for prolonged periods of time.
- Encourage the woman to position the sonicaid herself, or to raise her abdomen out of the water for the midwife to position it.
- Keep the area around the pool dry; wipe up any spills immediately to prevent any slips.
- Do not attempt to remove the woman from the pool if she is unable to move herself:
  - Call for immediate assistance
  - Maintain the woman's safety
  - Empty the pool
  - Follow the 'Procedure for removal of a woman from the pool if she is unable to do so herself' (Appendix I).
  - **It may be more prudent to stabilise her condition in the pool and then move her when it is safe to do so.**

Women who develop complications during labour, should be advised to leave the pool while they are still able to do so. Specific transfer criteria are listed in Recommendation Four.

## Recommendation Eight

Midwives should be aware of the infection control implications when facilitating a waterbirth

Water should be run through permanent plumbing for two minutes prior to use. If the pool is not used for 24 hours water should be flushed through the system for 2 minutes as above.<sup>31</sup>

Contamination of any kind may have an effect on the baby. Visible solids should be removed with a sieve. If the midwife feels there is heavy contamination the woman should be advised to leave the pool. Before the woman returns to the water the pool must be emptied, cleaned in accordance with current infection control recommendations and thoroughly dried before refilling.<sup>31, 33</sup>

Disposable Liners: a new liner is essential for each patient when using a portable pool. Used liners must be disposed of in yellow clinical waste bags. Ensure liner is not torn or leaking prior to use.<sup>31</sup>

Where disposable tubing is used this must be discarded after each use. All equipment must be thoroughly cleaned and sterilised after each use.<sup>33</sup>

Women who choose to use water for labour and birth during a planned homebirth should be advised of these measures to reduce the risk of infection.

### ***Blood Borne infections:***

Although the quantity of water will seriously reduce the risk from blood borne viruses, universal protections should always be taken. Midwives should pay particular attention to transmission via sclera and should wear protective glasses for all types of birth.<sup>31, 32,33,34,35,37</sup>

### ***Spontaneous Rupture of Membranes:***

There do not appear to be contraindications to use of pool for women with rupture of membranes at term (if all else is normal)<sup>37</sup>. Current evidence does not demonstrate a higher rate of maternal infection following waterbirth<sup>3,36,38</sup>.

## Appendix I:

### PROCEDURE FOR REMOVAL OF A WOMAN FROM THE POOL WHO IS UNABLE TO DO SO FOR HERSELF

**The aim of this procedure is to remove the woman from the pool in the quickest and safest way possible. Do not initiate this procedure if the woman is able to remove herself from the pool with some assistance.**

The degree of urgency will dictate how the woman is removed from the pool.

1. Assess the woman's condition
2. Call for assistance
3. Pull plug out of pool (if appropriate)
4. Take measures to stabilise the woman's condition
5. Remove the woman from the pool when it is safe to do so

Periodic drills for dealing with emergency situations should be practised.

## Appendix II: Guideline development

This guideline was written by a Working Party that comprised the following people:

<b>Nessa McHugh</b>	- Midwifery Tutor
<b>Denis Walsh</b>	- Midwifery Tutor
<b>Yvonne Ostah</b>	- Delivery Suite Manager
<b>Jean Walker</b>	- Practice Research and Development Midwife
<b>Joanne Clarke</b>	- Clinical Guideline Facilitator
<b>Di Weedon</b>	- Community Midwife

The review of this guideline was conducted by a Working Party that comprised the following people (alphabetical order):

<b>Nicola Baker</b>	- Clinical Risk and Complaints Coordinator
<b>Louise Dolby</b>	- Midwife, St Mary's Birth Centre
<b>Kathryn Gutteridge</b>	- Consultant Midwife
<b>Sue Holligan</b>	- Community Midwifery Manager
<b>Hannah Jarvis</b>	- Clinical Guidelines Facilitator
<b>Sue Nyombi</b>	- Midwife, Kensington Birth Centre
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<b>Jean Walker</b>	- Consultant Midwife
<b>Claire Welsh</b>	- Midwifery Manager, St Mary's Birth Centre

### Aims of the Guidelines

These guidelines aim to collate the best available evidence on waterbirth in order to provide midwives with a reference point to inform their practice.

### Guideline Development Methodology

Extensive literature searches were undertaken of the CINAHL, MEDLINE, Cochrane, MIDIRS and Embase databases, and relevant websites consulted. Existing waterbirth guidelines, both from local and national hospitals, were also gathered.

An independent review of all the available evidence was carried out by the Working Party members. The Working Party used this literature to make recommendations that reflect and reference the best available evidence. There are very few randomised controlled trials on which to base recommendations, therefore the existing evidence was combined with local consensus. Each recommendation has been rated according to the grade of evidence on which it is based and the strength of the recommendation accordingly.

These revised guidelines have been circulated through the Obstetric Governance Meetings for both the LRI and the LGH site for discussion and ratification.

Clinical guidelines are defined as:

*“systematically developed statements which assist the individual clinician and patient in making decisions about appropriate health care for specific conditions”* NHS Executive, 1996

Therefore, unlike protocols, clinical guidelines are not designed to be applied automatically – the clinician needs to exercise discretion in assessing the appropriateness of applying the guideline. *If the guideline isn't applied, then a reasonable explanation for the variance should be fully documented.*

### **Appendix III: Auditable Standards**

1. No of women who use the pool in labour
2. No of women who birth in the pool
3. Length of the 1<sup>st</sup> and 2<sup>nd</sup> stages of labour for women who labour and birth in the pool
4. No of women who have a physiological third stage in the pool
5. Reasons for the woman leaving the pool (including follow up data)
6. Perineal outcomes
7. Perinatal outcomes
8. Recorded cases of maternal or neonatal infection
9. Any recorded adverse events

## References

1. Rush J, Burlock S, Lambert K. The effects of whirlpool baths in labour: a randomised, controlled trial. *Birth*, 1996; 23(3):136-143
2. Aird I, Luckas M, Buckett et al. Effects of intrapartum hydrotherapy on labour related parameters *Australian & New Zealand Journal of Obstetrics & Gynaecology*, 1997; 37(2):137-42
3. Brown, L. The tide has turned: audit of waterbirth. *British Journal of Midwifery*, 1998; 4(5): 264 – 267.
4. Burns E, Greenish K. Pooling information. *Nursing Times* 1993; 89(8):47-9
5. Burke E, Kilfoyle A. A comparative study, waterbirth and bed birth. *Midwives* 1995; 108(1284):3-7
6. Garland D & Jones K. Waterbirth: Updating the evidence. *British Journal of Midwifery* 1997; 5(6):368-373
7. Hall S & Holloway I. Staying in control: women's experience of labour in water. *Midwifery* 1997; 14(1):30-36
8. Ford C, Creighton S, Batty A et al. Labour and delivery in the birthing pool. *British Journal of Midwifery* 1999; 7(3):165-171
9. Cammu H, Clasen K, Van Wettere L. To bathe or not to bathe during the first stage of labour. *Acta Obstetrica et Gynecologica Scandinavica* 1994; 73(6):468-472
10. Alderdice F, Renfrew M, Marchant S. Labour & birth in water in England & Wales: survey report. *British Journal of Midwifery* 1995; 3(7):375-382
11. Gilbert RE, Tookey PA. Perinatal mortality and morbidity among babies delivered in water: surveillance study and postal survey. *British Medical Journal*, 1999; 319: 483-487 (21 August)
12. Harrington L, Miller D, McClain C, Paul R. Vaginal birth after cesarean section in a hospital-based birth centre staffed by certified nurse-midwives. *Journal of Nurse Midwifery* 1997; 42(4):304-7
13. Kwee A, Graziosi G, van Leeuwen J et al. The effect of immersion on haemodynamic and fetal measures in uncomplicated pregnancies of nulliparous women. *British Journal of Obstetrics & Gynaecology* 2000; 107(5):663-68
14. Garland D. Waterbirth: Supporting practice with clinical audit. *Midwifery* 2000; 10(3):33-36
15. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth (Cochrane Review). In: *The Cochrane Library*, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd.

16. Hodnett ED. Home-like versus conventional institutional settings for birth (Cochrane Review). In: *The Cochrane Library*, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd.
17. Odent, M. Can water immersion stop labour? *Journal of Nurse – Midwifery*, Sept / Oct. 1997; 42(5): 414 – 416.
18. Epstein, M. Renal effects of head out of water immersion in man: implications for an understanding of volume homeostasis. *Physiology Review* 1978; 58: 529 – 581.
19. Anderson, B. Gyhagen, M.. Warm bath during labour: effects on labour duration and maternal and fetal infectious morbidity. *Journal of Obstetrics and Gynaecology* 1996; 16(5): 326 – 330.
20. Lines, M. Waterbirth: Feedback from mothers and midwives. *British Journal of Midwifery* 1993; 1(6): 264 – 258.
21. Garland D, Jones K. Waterbirth, first stage immersion or non-immersion? *British Journal of Midwifery* 1994; 2(3):113-20
22. Charles C. Fetal hyperthermia risk from warm water immersion. *British Journal of Midwifery*, 1998; 6(3): 152-156
23. Rosevear SK, Marlow N, Stirrat GM. Birthing pools and the fetus. *Lancet* 1993; 342:1048-1049
24. Power GG. Biology of temperature: the mammalian fetus. *Journal of Developmental Physiology* 1989; 12: 295-302
25. Lawrence Beech, B. *Waterbirth Unplugged*. 1996. Proceedings of 1<sup>st</sup> International Conference: Books for Midwives Press.
26. WHO 2000. Care in normal birth: A practical guide. Report of the technical working group Geneva WHO web page  
<http://www.who.int/rht/documents/MSM96-24/msm9624.htm>
27. Rogers, J. Wood, J. McCandlish, R. et al. Active versus expectant management of the third stage of labour: the Hinchingsbrooke randomised controlled trial. *Lancet*, 1998; 351:693- 699.
28. Levy, V. The midwife's management of the third stage of labour. In Alexander, J. Levy, V. and Roche, S. (eds) *Midwifery Practice – Intra partum care – A Research Based Approach*. 1990. Basingstoke/Macmillan.
29. Thilaganathan, B. Cutner, A. Latimer, J. Beard, R.. Management of the third stage of labour in women at low risk of postpartum haemorrhage. *European Journal of Obstetrics and Reproductive Biology*, 1993; 48: 19 – 22.

30. Garland, D. Waterbirth: An attitude to care. 1995. Books for Midwives/Hale.
31. Leicestershire Infection Control Policies
32. Bott J. HIV risk reduction & the use of universal protection. *British Journal of Midwifery*; 7 (11) Nov 99: 671 – 675.
33. Weiss.S.H. Risks & issues for health care workers *Medical Clinics of North America* pp555- 575 vol 81 no.2 in March 1997
34. Edmunds J. Midwifery HIV & Aids. *Birth Gazette* 12(1)1998: 12 – 18
35. Sharman JB, Ekoh S, Macmillan L et al. Blood splashes on the mask and goggles during caesarean section. *British Journal of Obstetrics & Gynaecology*; 104 (12) Dec 1997: 1405 – 1406.
36. West C. Water & birth from an infection control perspective. *Hunter valley midwives Association Journal* ; 5(3) pp3 – 9, May – June 1997
37. Eriksson M. Warm tub bath during labour: a comparative study of 1385 women. *Acta Obstetrica et Gynaecologica Scandinavica* vol. 75 no. pp642 – 644 7 Aug 1996
38. Harper B Brown L Waterbirth a 10 year retrospective study. *Midwifery Today* No 35 Vol 4 No 7: 12 – 13.
39. de Graaf JH. Severe blood loss in a neonate due to a ruptured umbilical cord in a bath delivery. *British Medical Journal*; Electronic responses to: Perinatal mortality and morbidity among babies delivered in water: surveillance study and postal survey. (25 February 2000)
40. National Institute for Clinical Excellence. *Caesarean Section. Clinical Guideline 13*. National Institute for Clinical Excellence. London April 2004. [www.nice.org.uk](http://www.nice.org.uk)
41. National Institute for Clinical Excellence. *Induction of Labour. Inherited Clinical Guideline D*. National Institute for Clinical Excellence. London. June 2001. [www.nice.org.uk](http://www.nice.org.uk)
42. Garland D, Crook S. Labour and birth: is the use of water in labour an option for women following a previous LSCS? *MIDIRS Midwifery Digest*. Vol 14, No 1. Mar 2004. pp 63-67.
43. Cluett ER et al. Randomised controlled trial of labouring in water compared with standard of augmentation for management of dystocia in first stage of labour. *British Medical Journal*. Doi:10.1136/bmj.37963.606412.EE (published 26 January 2004).
44. Harper B. Taking the plunge: reevaluating waterbirth temperature guidelines. *MIDIRS Midwifery Digest*. Jan 2003.

45. Nguyen S et al. Water Birth – a near drowning experience. *Pediatrics*. 110:2. Aug 2002.
46. Cro S and Preston J. Cord snapping at waterbirth delivery. *British Journal of Midwifery*. Vol 10 No 8. August 2002.