

# Waterbirth Fundamentals for Clinicians

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A related patient education handout can be found at the end of this issue and at [www.sharewithwomen.org](http://www.sharewithwomen.org)

Waterbirth is defined as fetal emergence underwater and is distinct from immersion hydrotherapy used during labor but not during the actual moment of birth.<sup>1</sup> Waterbirth requires maternity providers to expand their knowledge and skills beyond conventional birth care, including research and potential advantages and risks, in order to provide informed consent and to promote safe clinical practice. This issue of the *Journal of Midwifery & Women's Health (JMWH)* contains an integrative analysis of 38 peer-reviewed studies, which provides an overview of the most current evidence on waterbirth.<sup>1</sup> The current state of evidence suggests that the risk of harm from waterbirth to the mother and neonate is minimal. The purpose of this article is to present a combination of general physiologic principles and specific practice recommendations to facilitate safety during waterbirth, as well as clinical pearls to help increase midwives' knowledge of the care modality.

## FETAL PHYSIOLOGY

Midwives who provide waterbirth must understand the basic physiologic theory of fetal breathing movement (FBM) and the fetal dive reflex in order to answer the common question, "Why doesn't the baby drown?" Physiologic theory demonstrates that fetuses are subject to hormonal conditions during physiologic childbirth, which suppress FBM that normally occurs during late gestation and does not typically result in the intake of amniotic fluid into the lungs. Research suggests that the adaptive mildly hypoxic fetal environment during labor further inhibits FBM.<sup>2</sup> This is reinforced by endorphins produced during labor by women who do not receive pharmacologic pain relief methods.<sup>2</sup> These factors combine to make the risk of water aspiration related to FBM unlikely in healthy fetuses born underwater after uncomplicated parturition.

The fetal dive reflex can also serve as a protective mechanism to prevent water aspiration in neonates born in water. The dive reflex is normally present in human newborns and results in obstructive expiratory apnea and closure of the larynx in response to chemoreceptors triggered by foreign substances, including bathwater, near the vocal cords or cold air on the face.<sup>2-4</sup> The dive reflex can be overridden during sublethal hypoxia, necessitating appropriate fetal monitoring and the exclusion of compromised fetuses from birth in water in order to minimize the risk of water inhalation.<sup>2</sup>

## PRACTICE PRINCIPLES FOR WATERBIRTH

### Eligibility

Women may be considered candidates for waterbirth if they express a desire for the practice, are assessed as being at low perinatal risk, and are educated about the potential advantages and risks associated with waterbirth. A sample patient education handout about waterbirth appears in the Share with Women section of this issue of *JMWH*. A sample consent form for waterbirth can be found in the Supporting Information (see Appendix S1).

Maternal and fetal inclusion and exclusion criteria, based upon the best available evidence to date, are presented in Table 1. It is important to note that these eligibility criteria recommendations are based solely on an aggregate review of inclusion and exclusion criteria in published research.<sup>1</sup> The rationale for these criteria was not given in reviewed studies and is not based on evidence showing improved outcomes; rather, it was likely based on the judgment of the researchers. All sources reviewed prohibited waterbirth among those women considered to be at high risk due to significant obstetric or medical complications. Some researchers and providers differentiate criteria that preclude waterbirth but not immersion during labor. These include history of a shoulder dystocia, history of severe postpartum hemorrhage (> 1000 mL), meconium-stained amniotic fluid, suspected macrosomia, or fetal growth restriction.<sup>5-7</sup>

Another consideration regarding waterbirth eligibility is analgesia or anesthesia use. It is recommended that waterbirth be limited to women without the use of pharmacologic pain relief methods. In particular, systemic opioids have the potential to suppress the fetal dive reflex, which could increase the risk of fetal aspiration of water.<sup>3</sup> Maternal sedation could jeopardize the woman's ability to follow instructions or exit the tub in an emergency. If opioids are administered prior to immersion, the timing of administration, pharmacokinetic properties of the drug, and the woman's level of sedation must be considered to protect maternal and neonatal safety during waterbirth. Waterbirth is contraindicated following epidural or spinal analgesia/anesthesia because these can limit a woman's mobility.

### Water Temperature

Research literature reports a wide array of water temperatures appropriate for waterbirth. The only consensus is that water temperature should not exceed 38°C because fetal hyperthermia can result from elevated maternal temperatures, potentially causing dilated cerebral vasculature and increased oxygen consumption with the potential for fetal hypoxia.<sup>8</sup> Based on the best available evidence, water temperature

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**Table 1. Inclusion and Exclusion Criteria for Waterbirth**

Inclusion Criteria	Exclusion Criteria <sup>a</sup>
Singleton pregnancy	High-risk pregnancy or health condition
37–42 weeks' gestation	
Cephalic presentation	Abnormal fetal heart rate pattern
Stable maternal vital signs	Abnormal vaginal bleeding
Normal fetal heart rate prior to immersion	Maternal fever > 38°C
	Analgesia or anesthesia
	Untreated skin infection or active herpes simplex virus lesion
	Blood-borne pathogens
	Musculoskeletal, mobility, or other problems that can affect ability to leave the tub in an emergency

<sup>a</sup>Some facilities differentiate conditions or past medical histories that preclude waterbirth but not immersion during labor, eg, meconium-stained amniotic fluid, suspected intrauterine growth restriction, anticipated shoulder dystocia, and/or history of severe postpartum hemorrhage (> 1000 mL).<sup>6–8</sup>

during the second stage of labor should remain between 37°C and 38°C to avoid both premature respiratory stimulus upon birth into cooler water and fetal hyperthermia if water temperature is elevated.<sup>9</sup> Water temperature should be monitored hourly with a waterproof thermometer and regulated as necessary.

### Prevention of Infection

General principles for infection control include blood borne pathogen screening, universal precautions, and a tub-cleaning protocol after each use. Prior to cleaning, debris should be removed from the tub. Equipment (eg, waterproof thermometers, mirrors) should be cleaned along with the tub with an antibacterial solution that is effective against HIV and both hepatitis B and hepatitis C.<sup>8</sup> The amount and duration of germicidal cleaning should be based on the manufacturer's recommendations and approval by the institution's infection control staff. Finally, the tub should be rinsed with hot water and allowed to dry completely before refilling or relining for another birth.

### Fetal Assessment

The fetal dive reflex can be overridden in the presence of acute hypoxia.<sup>2</sup> Therefore, fetal surveillance should occur during water immersion for birth as it would for conventional birth. Waterbirth should be avoided if fetal compromise is suspected in order to prevent the possibility of fetal gasping upon birth.<sup>2,3</sup> Women laboring in water during the second stage should be monitored at least every 5 to 15 minutes with a waterproof Doppler or telemetry unit.<sup>10</sup> If a change in the fetal heart rate (FHR) is detected, maternal position changes and intrauterine resuscitation may be implemented in the water. If the FHR does not improve, the provider should assist the woman out of the tub to continue fetal assessment and intervention as necessary. While intermittent auscultation is the preferred method of monitoring fetal status during labor in

women at low risk for developing fetal acidemia,<sup>10</sup> continuous electronic fetal monitoring may be used during waterbirth when available and per maternal and care provider preference.

### CLINICAL PEARLS

Common clinical practices are presented in this section and can be useful for consideration by clinicians inexperienced with waterbirth.

#### Management of the Perineum

During immersion, the second stage of labor cannot be detected until the presenting part is visible externally; thus, fetal descent is often largely passive with a limited duration of active maternal pushing. A hands-off or hands-poised birth facilitated by controlled spontaneous maternal pushing efforts may be routinely practiced to increase maternal autonomy while protecting providers' from the strain of leaning over the tub during the birth.

#### Management of the Birth

Physiologic theory supports that the neonate must be born completely underwater without exposure to cooler temperatures and air until the face is brought to the surface of the water.<sup>2,3</sup> If a woman raises herself out of the water mid-birth and exposes the fetal head to air, she is advised to remain out of the water for birth of the body to avoid the potential initiation of newborn respiration and the risk of newborn bath-water inhalation. After the fetal head is birthed underwater, it may rest on the perineum without support to allow time for restitution and external rotation, as with conventional birth. If the woman is in a position that does not allow for visualization of the perineum or fetal head, a handheld mirror can be helpful for assessing the perineum or neonate. Loose nuchal cords and other entanglements can be resolved as the neonate is born into water and brought to the surface for the first breath.

The body usually is birthed with the next contraction, and the neonate should then be gently and directly guided to the surface within 5 to 10 seconds. The time of birth should be noted when the neonate's entire body has emerged from the mother. Postural drainage can be facilitated by bringing the neonate out of the water facedown. Under no circumstance should the neonate's head or face be resubmerged under water after it has been brought to the surface. The neonate should be kept on the mother's chest, with partial submersion of the torso and extremities to facilitate thermoregulation. Skin-to-skin contact with the mother and submersion of the neonate's lower extremities, abdomen, and chest will maintain the newborn's body temperature. The exposed head should be dried to reduce heat loss.

#### Management of the Umbilical Cord

Neonates born in water can experience cord avulsion. It is not known, however, if the incidence is higher than for conventional birth due to a lack of data permitting direct comparison.<sup>1,11</sup> To minimize the possibility of avulsion,

providers should assess cord length and avoid cord tension when bringing a water-born neonate to the surface. Cord clamps should be readily available at every waterbirth. If unusual blood loss is noted immediately after birth, the cord should be inspected for avulsion and immediately clamped at the umbilicus in order to protect the neonate from hemorrhage. Abnormal or excessive bleeding can be identified by assessing water clarity; if the woman's legs are not easily visualized, she might be actively bleeding and should be assisted out of the tub for further evaluation.

### Management of the Newborn

Providers who facilitate waterbirth must educate their patients and staff that water-born neonates might not become pink in the first minute of life, and this might be a normal finding in the presence of a normal heart rate, tone, grimace, and/or cry. The first breath can be slightly delayed among water-born neonates, and some clinicians advocate for assessing the one-minute Apgar score 60 seconds after the fetal head is brought to the surface of the water.<sup>12</sup> Regardless of the heart rate and tone, if respirations are not initiated within 30 seconds of birth despite early stimulation, the neonate should be immediately resuscitated. If tachycardia, bradycardia, hyperthermia (>38°C), or hypothermia (<37°F) are noted, the neonate should be taken out of the tub for further assessment and intervention.

### Management of the Third Stage

The third stage of labor with delivery of the placenta may be performed in water at the discretion of the provider and maternal preference. Physiologic management may be provided for low-risk women, after informed consent, to include delivery by maternal effort without early cord clamping or traction, uterine palpation, or exogenous oxytocin.<sup>9</sup> To date, there is no evidence to support the active management of the third stage in water; therefore, if active management is desired, the women should be assisted out of the tub for the third stage of labor.

Advice for problems such as management of the tight nuchal cords, shoulder dystocia, and loss of consciousness can be found in the Supporting Information: Appendix S2.

## IMPLEMENTING WATERBIRTH IN CLINICAL PRACTICE

Providing hospital waterbirth requires a supportive environment with administrative engagement, policies and procedures, adequate staffing, and collaborative relationships among members of the health care team. To promote safety, all staff involved in intrapartum care should receive training in waterbirth protocols. A sample clinical guideline, based on the best available evidence to date, is presented in Appendix S2. Its aim is to help midwives interested in providing waterbirth optimize the benefits of warm water immersion while minimizing maternal and neonatal risks of waterbirth.

Barriers to implementation need to be discussed by an interprofessional and interdisciplinary group, and resistance to change among staff members must be acknowledged prior to

**Table 2. Strategies for Moving Evidence into Clinical Practice**

<b>Least Effective</b>
Disseminate educational materials (eg, guidelines, practice recommendations, and research articles)
Attend conferences and lectures
<b>Moderately Effective</b>
Provide audit or verbal feedback on performance
Use local opinion leaders (peer-nominated colleagues for educational input)
Local consensus process (agreement among professionals on clinical issues)
Interprofessional collaboration
<b>Most Effective</b>
Educational outreach visits (meeting professionals in the practice environment)
Active rather than passive participation
Involvement of local, influential clinicians
Mentor clinicians as they adjust their practice
Ongoing audit of processes and clinical outcomes

Sources: Davies, 2002<sup>13</sup>; Walsh, 2011.<sup>14</sup>

implementation of a waterbirth program.<sup>12</sup> Common barriers cited in waterbirth research include issues related to individual providers (eg, lack of knowledge or skill, attitudes), social issues (eg, patient expectations, professional organization positions, institutional policies), and issues related to resource availability and fiscal considerations.<sup>12,14–16</sup> Systematic reviews suggest that there is no superior strategy for moving research evidence into clinical practice; a combination of strategies is often most effective.<sup>13</sup> Table 2 outlines potential strategies for midwives to use when starting a waterbirth practice. A list of helpful resources for providers interested in waterbirth is presented in Table 3.

Waterbirth provides an opportunity for midwives to partner with women in a therapeutic relationship to facilitate physiologic birth tailored to an individual's needs and preferences in the context of family-centered care. Qualities identified by Harper that can impact the success of waterbirth include confidence, cooperation, candor, compliance, and constancy.<sup>6</sup> She states that the attending provider and laboring mother must possess confidence in waterbirth, which will result from education and experience with the practice. In particular, Harper urges providers to understand and communicate about neonatal physiology as the "uninformed or inexperienced provider becomes anxious to get the baby out" rather than trusting that the uncompromised neonate is safe in the water immediately after birth.<sup>6</sup> However, Harper also recommends compliance, cooperation, and candor with the woman who should be advised prior to immersion that if "something feels not right," the mother will be expected to comply with the provider's request to exit the tub.<sup>6</sup> She concludes that when mutual understanding is experienced and a feeling of constancy is established, the laboring woman is free to experience her labor in an instinctive way that facilitates her needs.<sup>6</sup>

**Table 3. Helpful Resources on Waterbirth**

Resource	Author, Year, Type of Resource	Description
<i>Revisiting Waterbirth: An Attitude of Care</i>	Garland <sup>8</sup> 2011 Book	An essential text for midwifery practice. The book gives clear guidance on the use of water immersion during labor and birth, using clinical scenarios and research summaries for students and practitioners.
<i>Water Labour, Water Birth: A Guide to the Use of Water During Childbirth</i>	Sprague <sup>17</sup> 2011 Book	Includes detailed information on the indications, benefits, and risks of water immersion during labor and birth, and practical tips and hints on effective utilization. It summarizes the author's research and provides clinical guidelines.
<i>Waterbirth Unplugged: Proceedings from the first International Water Birth Conference</i>	Beech <sup>18</sup> 1996 Book	Conference proceedings from the first International Water Birth Conference held in London in April 1995. Many unpublished research reports are included, along with perspectives from some of the most experienced waterbirth providers.
<i>The Waterbirth Handbook: The Gentle Art of Waterbirthing</i>	Lichy & Herzberg <sup>19</sup> 1993 Book	Contains descriptions of waterbirths attended by Dr. Lichy. It covers the history, safety, and practicalities of waterbirth.
<i>Midwifery Guidelines for the Use of Water in Labour</i>	Burns & Kitzinger <sup>20</sup> 2005 Protocol	Includes recent research on the use of warm water immersion during labor and birth. Discusses the rationale, practical considerations, benefits and risks, and tub preparation.
<i>Born in Water: A Sacred Journey</i>	Gallardo <sup>21</sup> 2005 DVD	A collection of 7 water birth videos, including a home waterbirth. Birth partners and midwives are shown actively supporting women during labor and birth.
<i>Waterbirth in the 21st Century: Aquatic Experience in Ostend</i>	Raes <sup>22</sup> 2005 DVD	Filmed at the Aqanatal Center in Ostend, Belgium. Covers prenatal preparation, water births including breech and twin births, and postnatal experiences in water.

Midwives have a responsibility to make safe clinical judgments in partnership with women, based on informed discussions that review available data and limitations of research. In some cases, including waterbirth, this responsibility and shared decision making can result in diverging from normative practices.<sup>14</sup> When considering an intervention that is not part of conventional care, such as waterbirth, the use of current evidence can help promote maternal and fetal safety while evolving evidence is generated. The future of waterbirth in the United States will depend on the beliefs and experiences of childbearing families and their care providers as well as ongoing investigation by researchers who continue to assess the intervention.

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## CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's Web site:

**Appendix S1:** Waterbirth Consent Form

**Appendix S2:** Clinical Guideline For Hydrotherapy in Labor & Birth

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