



The American College of
Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

COMMITTEE OPINION

Number 679 • November 2016

(Replaces Committee Opinion Number 594, April 2014)

Committee on Obstetric Practice

The American Academy of Pediatrics endorses this document. This Committee Opinion was developed by the American College of Obstetricians and Gynecologists' Committee on Obstetric Practice in collaboration with committee members Joseph R. Wax, MD and Jeffrey L. Ecker, MD.

This document reflects emerging clinical and scientific advances as of the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed.

Immersion in Water During Labor and Delivery

ABSTRACT: Immersion in water during labor or delivery has been popularized over the past several decades. The prevalence of this practice in the United States is uncertain because it has not been studied in births outside of the home and birth centers, and the data are not recorded on birth certificates. Among randomized controlled trials included in a 2009 Cochrane systematic review that addressed immersion in the first stage of labor, results were inconsistent with regard to maternal benefits. Neither the Cochrane systematic review nor any individual trials included in that review reported any benefit to the newborn from maternal immersion during labor or delivery. Immersion in water during the first stage of labor may be associated with shorter labor and decreased use of spinal and epidural analgesia and may be offered to healthy women with uncomplicated pregnancies between 37 0/7 weeks and 41 6/7 weeks of gestation. There are insufficient data on which to draw conclusions regarding the relative benefits and risks of immersion in water during the second stage of labor and delivery. Therefore, until such data are available, it is the recommendation of the American College of Obstetricians and Gynecologists that birth occur on land, not in water. A woman who requests to give birth while submerged in water should be informed that the maternal and perinatal benefits and risks of this choice have not been studied sufficiently to either support or discourage her request. Facilities that plan to offer immersion during labor and delivery need to establish rigorous protocols for candidate selection; maintenance and cleaning of tubs and pools; infection control procedures, including standard precautions and personal protective equipment for health care personnel; monitoring of women and fetuses at appropriate intervals while immersed; and moving women from tubs if urgent maternal or fetal concerns or complications develop.

Recommendations

The American College of Obstetricians and Gynecologists (the College) makes the following recommendations:

- Immersion in water during the first stage of labor may be associated with shorter labor and decreased use of spinal and epidural analgesia and may be offered to healthy women with uncomplicated pregnancies between 37 0/7 weeks and 41 6/7 weeks of gestation.
- There are insufficient data on which to draw conclusions regarding the relative benefits and risks of immersion in water during the second stage of labor and delivery. Therefore, until such data are available, it is the recommendation of the College that birth occur on land, not in water.
- A woman who requests to give birth while submerged in water should be informed that the maternal and perinatal benefits and risks of this choice have not been studied sufficiently to either support or discourage her request. She also should be informed of the rare but serious neonatal complications associated with this choice.
- The opinions expressed in this document should not be interpreted in such a manner as to prevent the

conduct of well-designed prospective studies of the maternal and perinatal benefits and risks associated with immersion during labor and delivery.

- Facilities that plan to offer immersion during labor and delivery need to establish rigorous protocols for candidate selection; maintenance and cleaning of tubs and pools; infection control procedures, including standard precautions and personal protective equipment for health care personnel; monitoring of women and fetuses at appropriate intervals while immersed; and moving women from tubs if urgent maternal or fetal concerns or complications develop.

Immersion in water during labor or delivery has been popularized over the past several decades. The prevalence of this practice in the United States is uncertain because it has not been studied in births outside of the home and birth centers, and the data are not recorded on birth certificates (1). In other countries, the prevalence of water immersion varies with birth setting and cultural factors (2, 3). For example, the United Kingdom recently reported rates of immersion ranging from 1.5% of hospital deliveries to 58% of births in a freestanding midwifery unit (2, 4). Several professional organizations, including the Royal College of Obstetricians and Gynaecologists and the American College of Nurse–Midwives, support healthy women with uncomplicated pregnancies laboring and giving birth in water (5, 6). The United Kingdom’s National Institute for Health and Care Excellence states that women should be informed that there is insufficient high-quality evidence to either support or discourage giving birth in water (7). The purposes of this Committee Opinion are to review the current literature concerning the reported benefits and risks of immersion in water during labor and delivery and, based on these data, to provide updated clinical recommendations and support for well-designed research regarding these practices.

Evidence Regarding Immersion in Water During Labor and Delivery

It is important to recognize the limitations of the relevant studies concerning immersion during labor or delivery. There often is not a uniform definition of the exposure itself. Commonly, immersion is referred to as “water birth,” but effects and outcomes may be different for immersion during the first stage of labor and the second stage, including delivery. Accordingly, this document avoids the term “water birth” and makes an effort to distinguish data and outcomes related separately to immersion in the first stage of labor and the second stage with delivery. Not all studies identify the point in the course of labor at which immersion was undertaken, considering together the outcomes for all women undergoing immersion in the first stage of labor, second stage of labor, or both (2, 8). Outcomes indicating safety or risk in association with immersion at one stage of labor may not translate into equivalent outcomes at a different stage

of labor; specifically, outcomes during the first stage of labor may not be the same as outcomes associated with birth under water. In addition to this important limitation, many studies do not fully describe the conditions under which immersion occurred, including duration of immersion, water temperature, depth of the bath or pool, and whether or not agitation (jets or whirlpool) was used (1, 2, 8–12). Additionally, when reported, conditions vary across studies.

Studies of outcomes associated with immersion during labor and delivery include retrospective, prospective observational, and randomized clinical trials. Retrospective studies, which often report data from a single center, cannot demonstrate causal relationships between observed outcomes and exposure to immersion. Retrospective and prospective observational studies categorize results, including those from labor with second-stage immersion through delivery, according to the actual (rather than the intended) exposures to immersion (4, 9, 11, 13–17). In doing so, the analyses may inappropriately exclude or reassign outcomes from the immersion group to the unexposed group. The results of this approach may overestimate the salutary effects and underestimate the adverse effects observed with immersion. These misestimations may be accentuated when women undergoing water immersion exhibit fewer obstetric risk factors than those not undergoing immersion (9). Rather than considering all intended underwater births as a single study group, another report analyzed these deliveries as two distinct groups: 1) those that actually occurred during submersion and 2) those that did not (1). This approach precludes drawing conclusions regarding the relative merits and risks of intended delivery while submerged. Most studies consider only healthy women with singleton pregnancies between 37 0/7 weeks and 41 6/7 weeks of gestation with cephalic-presenting fetuses as candidates for immersion, potentially limiting the generalizability of the results (2, 8, 10, 18).

In considering the evaluation of outcomes, it is important to note that obstetrician–gynecologists and other health care providers involved in providing or studying immersion therapy are not masked to either the treatment or the outcomes and, especially in nonrandomized studies, outcomes may be influenced by differences in the environment attending a particular choice of delivery. Because of their sample sizes, most individual trials of immersion therapy are limited in their power to detect differences in rare outcomes.

Randomized controlled trials (RCTs) would be ideal to address many of the aforementioned concerns. A Cochrane review identified 12 relevant and appropriately designed RCTs of immersion during labor, which involved 3,243 women. Nine of these trials involved immersion during the first stage of labor alone (one of nine trials compared early immersion with later immersion during the first stage), two trials involved first stage of labor and second stage, and one trial involved

comparing only the second stage of labor with the controls. Even among these RCTs, however, some limitations remain, including concerns about power and how the absence of blinding may affect definition of outcomes. The systematic review also noted that most trials have small sample sizes and, thus, a high risk of bias. These factors limit comparison across trials and the reliability and validity of the trial findings (10).

Benefits Associated With Immersion During Labor and Delivery

Maternal Benefits

First-Stage Immersion

Among RCTs included in a 2009 Cochrane systematic review that addressed immersion in the first stage of labor, results were inconsistent with regard to maternal benefits. Although many individual RCTs reported no benefit, the combined data indicated that immersion during the first stage of labor was associated with decreased use of epidural, spinal, or paracervical analgesia among those women allocated to water immersion compared with controls (478 of 1,254 versus 529 of 1,245; risk ratio [RR], 0.90; 95% confidence interval [CI], 0.82–0.99; six trials). However, no difference was observed in opioid analgesia use among those women assigned to immersion compared with controls (RR, 0.85; 95% CI, 0.46–1.56; four trials). There was a reduction in duration of the first stage of labor (mean difference, –32.4 minutes; 95% CI, –58.7 to –6.13). However, considering each of these effects, it is difficult to know how factors other than immersion, such as the structure of care (including the presence of an obstetrician–gynecologist and other health care providers and timing and frequency of examinations), affected the outcome. Furthermore, there were no differences in the incidence or severity of perineal trauma (RR, 1.16; 95% CI, 0.99–1.35; five trials), including third-degree and fourth-degree lacerations (RR, 1.37; 95% CI, 0.86–2.17; five trials) and episiotomy (RR, 0.93; 95% CI, 0.80–1.08; five trials) or need for either assisted vaginal delivery (RR, 0.86; 95% CI, 0.71–1.05; seven trials) or cesarean delivery (RR, 1.21; 95% CI, 0.87–1.65; eight trials) between those allocated to the immersion arm and the control arm in the meta-analysis results (10).

Second-Stage Immersion Including Delivery

Individual prospective observational and retrospective studies report associated benefits of immersion to include fewer episiotomies (4, 12, 17, 19) and less use of pharmacologic analgesia (9, 17). Findings are inconsistent regarding labor duration (12, 16, 17) and perineal lacerations (1, 4, 9, 12, 16, 17). Among the two trials that reported outcomes from immersion in the second stage of labor included in the Cochrane systematic review, the only difference in maternal outcomes from immersion during the second stage was an improvement in satisfaction among those allocated to immersion in one trial (10).

First-Stage and Second-Stage Immersion

Additional potential benefits of immersion were noted in studies that did not distinguish between women undergoing immersion during the first stage of labor, second stage of labor, or both. Limited data obtained from interviews or questionnaires completed by women after labor with immersion suggest associated experiential benefits that include feelings of relaxation, warmth, privacy, and an improved ability to maintain control during labor (20–23). A secondary analysis of data from the prospective observational Birthplace in England study found that immersion was associated with significant reductions in antepartum transfers to hospitals for planned home births, freestanding midwifery unit births, and alongside midwifery unit births (2).

Newborn Benefits

Neither the Cochrane systematic review nor any individual trials included in that review reported any benefit to the newborn from maternal immersion during labor or delivery (10). In a subsequent systematic review and meta-analysis, newborn outcomes after second-stage immersion and birth in water were compared with land birth. Data from the 12 included studies (two randomized trials, three prospective and two retrospective cohort, and five case–control studies) showed no neonatal benefits associated with immersion (18). The most recent and largest meta-analysis and systematic review examining this question included 29 studies. Although no neonatal benefits were observed, the authors noted that the existing evidence was insufficient to rule out that possibility (24).

Complications Associated With Immersion During Labor and Delivery

Maternal Risks

Prospective observational and retrospective studies do not describe a greater prevalence of adverse maternal outcomes among women experiencing water immersion than those who do not. The 2009 Cochrane systematic review found no increase in maternal infections (RR, 0.99; 95% CI, 0.50–1.96; five trials) with immersion during the first stage of labor. There was no statistically significant difference in the frequency of postpartum hemorrhage among women undergoing immersion during the second stage of labor (RR, 0.14; 95% CI, 0.10–2.71; one trial). The available evidence does not suggest an increased risk of adverse maternal outcomes with water immersion during labor and delivery. However, this conclusion must be tempered by the lack of data on rare serious outcomes, such as severe morbidity and mortality.

Neonatal Risks

First-Stage Immersion

The 2009 Cochrane systematic review showed that, when compared with controls, fetuses of women who

experienced immersion were not at increased risk of meconium-stained amniotic fluid (RR, 0.95; 95% CI, 0.76–1.19; five trials) or abnormal fetal heart rate patterns (RR, 0.75; 95% CI, 0.34–1.67; three trials). Neonates of women allocated to water immersion exhibited no increased risk of infection (RR, 2.00; 95% CI, 0.50–7.94; five trials), neonatal intensive care unit admission (RR, 1.06; 95% CI, 0.71–1.57; three trials), or 5-minute Apgar scores of less than 7 (RR, 1.58; 95% CI, 0.36–3.93; one trial). Of note, this review was underpowered to assess mortality and did not evaluate respiratory distress as an outcome (10). In addition, in a randomized trial comparing standard augmentation with immersion, which was excluded from the Cochrane analysis because all labors included were characterized by *slow progress* (defined as cervical dilation of less than 1 cm/hr), 12% of neonates in the immersion arm required intensive care unit admission compared with none in the unexposed group ($P=.013$). The indications for intensive care could not be linked directly to immersion (23). The available evidence does not suggest an increased risk of adverse fetal or neonatal outcomes with water immersion during the first stage of labor.

Second-Stage Immersion Including Delivery

Concerns have been expressed that immersion in water during delivery may predispose the infant to potentially serious neonatal complications, such as infection, water aspiration (fresh-water drowning), and umbilical cord avulsion (10). Individual case reports and case series have reported several serious adverse outcomes among neonates intentionally delivered in water. Cases of major infection with *Pseudomonas aeruginosa* (25, 26) and *Legionella pneumophila* (27–29), two of which were fatal (26, 29), have been observed. Importantly, several of these cases noted additional risk factors for infection, including inadequate pool disinfection (29), heated immersion water (27), pool filling 2 weeks before intended use (27, 29), and using water from a contaminated source (29). Therefore, facilities offering immersion must establish rigorous protocols for maintenance and cleaning of tubs and immersion pools and infection control procedures.

Another observed complication is water aspiration (30–34), which may be accompanied by hyponatremia (30, 34) and seizures (30). Although it has been claimed that neonates delivered into the water do not breathe, gasp, or swallow water because of the protective “diving reflex,” experimental studies on animals and a vast body of literature from meconium aspiration syndrome demonstrate that, in compromised fetuses and neonates, the diving reflex is overridden, which potentially leads to gasping and aspiration of the surrounding fluid (35). Moreover, the presence of the diving reflex at birth and timing of its activation in healthy newborns have been questioned (36). Conceivably, uncompromised fetuses may be at risk of water aspiration and its resulting sequelae.

Umbilical cord avulsion (cord “snapping” or cord rupture) has been observed as the newborn is lifted or maneuvered out of the water. Although most instances were not associated with additional neonatal morbidity, some affected newborns have required intensive care unit admission (37) and transfusion (38). A recent retrospective review found a cord avulsion rate of 3.1 in 1,000, neonatal intensive care admission rate of 1.9/1000, and transfusion rate of 0.4 in 1,000 deliveries occurring in water (38). One study included in this review observed one avulsion in every 288 immersion births compared with one avulsion in every 1,361 land births (8). Currently, evidence-based guidelines to reduce the rate of cord avulsion do not exist.

No increased frequency of adverse neonatal outcomes after second-stage immersion or delivery while submerged was found by the 2009 Cochrane synthesis of randomized trials, one meta-analysis (18), or in an additional meta-analysis and systematic review (24). The Cochrane review noted limited data regarding morbidity and mortality, concluding that “there is insufficient evidence about the use of water immersion during second stage of labour and therefore clear implications cannot be stated” (10). The meta-analysis also recognized that mortality and morbidity data were limited, including data on cord avulsion, water aspiration, and hyponatremia, but additionally could not draw firm conclusions because of the results’ heterogeneity (18). The meta-analysis and systematic review concluded that although underwater births were not associated with an increase in harm to newborns, existing evidence is insufficient to eliminate the possibility of additional rare but serious adverse outcomes (24). It also noted an absence of data regarding long-term comparative outcomes between underwater and land births.

Summary

Immersion in water during the first stage of labor may be associated with shorter labor and decreased use of spinal and epidural analgesia and may be offered to healthy women with uncomplicated pregnancies between 37 0/7 weeks and 41 6/7 weeks of gestation. There does not appear to be an associated increased risk of adverse maternal, fetal, or neonatal outcomes.

There are insufficient data on which to draw conclusions regarding the relative benefits and risks of immersion in water during the second stage of labor and delivery. Several serious neonatal complications have been reported, but the actual incidence has not been determined in population-based analyses. Therefore, until such data are available, it is the recommendation of the College that birth occur on land, not in water. The College supports conducting well-designed prospective studies of the maternal and perinatal benefits and risks associated with immersion during labor and delivery. Specifically, this document is not intended to prevent the conduct of such studies.

Furthermore, the College recognizes that despite the opinions expressed in this document, a woman may request immersion during the second stage of labor, including giving birth while submerged. This decision should represent an informed choice; a woman who requests to give birth while submerged in water should be informed that the maternal and perinatal benefits and risks of this choice have not been studied sufficiently to either support or discourage her request. She also should be informed of the rare but serious neonatal complications associated with this choice. If the physician believes, based on evidence, that second-stage immersion and giving birth while submerged would be detrimental to the overall health and welfare of the woman or the fetus, he or she should not perform such a delivery (39).

Although it has not been the focus of specific trials, facilities that plan to offer immersion during labor and delivery need to establish rigorous protocols for candidate selection; maintenance and cleaning of tubs and pools; infection control procedures, including standard precautions and personal protective equipment for health care personnel; monitoring of women and fetuses at appropriate intervals while immersed; and moving women from tubs if urgent maternal or fetal concerns or complications develop.

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ISSN 1074-861X

The American College of Obstetricians and Gynecologists
409 12th Street, SW, PO Box 96920, Washington, DC 20090-6920

Immersion in water during labor and delivery. Committee Opinion No. 679. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2016;128:e231–6.