National Institute for Health and Care Excellence

Intrapartum care

[Q] Evidence review for the effects and safety of water immersion during the second stage of labour

NICE guideline NG235

Evidence underpinning recommendations 1.6.13 and 1.9.24

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Final

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1.1 Review question

This evidence review summarises the evidence for:

What are the effects and safety of water immersion during the second stage of labour in healthy women with uncomplicated singleton pregnancies at term and their babies?

Further technical detail can be found in the separate technical appendices for this review.

1.1.1 Summary of the protocol

See Table 1 for a summary of the Population, Intervention, Comparison and Outcome (PICO) characteristics of this review.

Table 1: Summary of the protocol (PICO table)

Population	Women in labour with uncomplicated singleton pregnancy at term (between 37 and 42 weeks of gestation), where the woman and fetus are healthy and at low risk of complications (as defined by trial authors)
Interventions	• Water immersion during the second stage of labour • Water immersion during the second stage of labour plus water immersion during the first and/or third stage of labour
Comparator	• No water immersion during labour or standard care (as defined in the study) • Water immersion only during the first stage of labour
Outcomes	**Critical** • Mode of birth (spontaneous vaginal birth, instrumental birth and caesarean birth) • Perineal trauma (third-degree or fourth-degree tear) • Fetal and neonatal mortality (within 28 days) **Important** • Postpartum haemorrhage (minor: 500-1000 ml; major: >1000 ml, within 24 hours) • Maternal satisfaction (quantitative data) • Neonatal unit admission

	• Hypoxic-ischaemic encephalopathy • Snapped umbilical cord (cord avulsion)
Study type	• Systematic reviews of randomised controlled trials (RCTs) or comparative cohort studies • RCTs • Comparative prospective cohort studies with at least 50 participants per arm • Comparative retrospective cohort studies with at least 50 participants per arm
Key confounders	Maternal age, parity, ethnicity, birthweight, and socio-economic status

Abbreviations: RCT: randomised controlled trial

The full protocol has been published on the NICE website: Evidence | Intrapartum care | Guidance | NICE.

1.1.2 Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol and in **appendix J** in the technical appendices document.

Declarations of interest were recorded according to NICE's conflicts of interest policy.

1.1.2.1 Search methods

The searches for the effectiveness evidence were run on 21/05/2025. The following databases were searched: Cochrane Central Register of Controlled Trials (CENTRAL) (Wiley); Cochrane Database of Systematic Reviews (CDSR) (Wiley); Cumulative Index to Nursing and Allied Literature (CINAHL) (Ebscohost); Embase (Ovid); Emcare (Ovid); Epistemonikis (https://www.epistemonikos.org/); MEDLINE (Ovid); Limits were applied to remove animal studies, editorials, conference abstracts, empty registry entries and references not published in the English language. A date limit of 2005 to 2025 was applied.

The database searches were supplemented with additional search methods. Forward citation searching was conducted on Web of Science Core Collection

(Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index and Emerging Sources Citation Index); Google Scholar using three seed references identified from the included references of CG190 Intrapartum care for healthy women and babies. Reference list searches were conducted on Web of Science Core Collection (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index and Emerging Sources Citation Index) using five seed references from the NICE surveillance review.

The searches for the cost effectiveness evidence were run on 21/05/2025. The following databases were searched: Embase (Ovid); International HTA Database (https://database.inahta.org); MEDLINE ALL (Ovid).

A NICE senior information specialist (SIS) conducted the searches. The MEDLINE strategy was quality assured by another NICE SIS. All translated search strategies were peer reviewed to ensure their accuracy. Both procedures were adapted from the 2015 PRESS Guideline Statement. Further details and full search strategies for each database are provided in Appendix B.

1.1.2.2 Protocol deviations

There were no protocol deviations in this review.

1.1.3 Effectiveness evidence

1.1.3.1 Included studies

Study selection

A systematic search was carried out to identify potentially relevant studies as detailed in the above section. See **appendix B** in the technical appendices document for the literature search strategy. The study selection process is presented as a PRISMA diagram in **appendix C** in the technical appendices document.

Four studies were included in this review, 3 retrospective cohort studies (Aughey 2021, Bailey 2020, Bovbjerg 2022) and 1 cohort study, which

included both retrospective and prospective cohorts (Sanders 2024). The included studies are summarised in Table 2.

There were a number of elements in the PICO that were not covered by any studies. None of the included studies reported the following outcomes: mode of birth (spontaneous vaginal birth, instrumental birth and caesarean birth), maternal satisfaction, and hypoxic-ischaemic encephalopathy.

Two studies compared water immersion during labour and birth to water immersion only in labour or no water immersion (Bailey 2020, Sanders 2024). Two studies compared giving birth in water or under water birth to not having water birth or unexposed to water birth (Aughey 2021, Bovbjerg 2022).

One retrospective cohort study (Aughey 2021) included both low and intermediate-risk singleton term spontaneous vaginal births. This study did not clearly state the number of participants with intermediate risk. However, it stated that the women had no risk factors requiring them to give birth in an obstetric unit according to UK national guidelines. Therefore, we have inferred that the majority of participants had low risk pregnancies and included this study.

One study (Sanders 2024) reported the perineal trauma outcome (third-degree or fourth-degree tear at birth) stratified by parity. The remaining three studies (Aughey 2021, Bailey 2020, Bovbjerg 2022), and the other outcomes in Sanders 20024, reported combined results for nulliparous and multiparous women.

All studies adjusted or matched for key covariates, maternal age, parity, and ethnicity but not all studies adjusted for other covariates birthweight and socio-economic factors.

Subgroup analysis was not conducted because of insufficient evidence. There was no statistical heterogeneity in the single outcome that was pooled.

1.1.3.2 Excluded studies

Details of studies excluded at full text, along with the primary reason for exclusion, are given in **appendix I** in the technical appendices document.

1.1.4 Summary of studies included in the effectiveness evidence

Table 2 Summary of studies included in the effectiveness evidence

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
Aughey 2021 Study type: Retrospective cohort study Setting: Home and midwifery-led unit Location: UK Funding source: NHS England and the Scottish and Welsh Governments	N=46088 Water birth: N=6264 Birth out of water: N=39824 Women aged 18-44 years (gestation age 37^{+0} to 42^{+6} weeks) with BMI <35 kg/m^2 and without pre-existing medical conditions or previous obstetric complication or conditions arising in pregnancy Maternal age (N for different age groups)*: 18-24 years: 9569 25-29 years: 13810 30-34 year: 14359	<u>Water birth</u> Having water birth or giving birth in water	<u>Birth out of water</u> Not having water birth	• Perineal trauma (OASI or third/fourth-degree tear) (at birth) • Postpartum haemorrhage (≥1500 ml)** • Neonatal unit admission** **Follow-up period not reported	Multivariate logistic regression was used to control for maternal age, maternal BMI, parity, ethnicity, socio-economic status, and birthweight

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
	35-39 years: 7142 40-44 years: 1208 Parity (N): Parity 0: 17206 Parity 1: 18914 Parity 2: 6691 Parity 3+: 3277 Ethnicity (N)*: White: 37581 Black: 2339 Asian: 4506 Other: 143 BMI in kg/m^2 (N reported for different BMI groups)*: 18.5-24.9 kg/m^2: 27011 25.0-29.9 kg/m^2: 13698 30-34.9 kg/m^2: 5379 Active management of the third stage of labour: not reported				

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
	Perineal compression: not reported *Data not reported separately for each group				
Bailey 2020 Study type: Retrospective cohort study Setting: Midwifery-led units within tertiary care hospitals Location: USA Funding source: not reported	N=794 Water birth: N=397 Land birth: N=397 Women with singleton low-risk term pregnancy (gestation age >37 weeks) Maternal age in years, mean (range): Water birth: 30.8 (17-45) Land birth: 31.0 (17-46) Parity:	<u>Water birth</u> Water immersion (hydrotherapy) in labour and birth	<u>Land birth</u> Water immersion (hydrotherapy) only in labour or no water immersion	• Perineal trauma (third/fourth-degree tear) (at birth) • Fetal and neonatal mortality (perinatal death)** • Postpartum haemorrhage (500-1000 ml, ≥1000 ml)** • Neonatal unit admission** **Follow-up period not reported	The study matched for maternal age, race/ethnicity, parity, insurance, site, BMI, and history of prior caesarean section, but birthweight and other important socio-economic factors were not adjusted for

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
	Water birth: Nulliparous N=129; Multiparous N=248 Land birth: Nulliparous N=131; Multiparous N=266 Ethnicity: Water birth: White N=313; Black N=14; Other N=42 Land birth: White N=329; Black=16; Other N=52 BMI in kg/m^2; mean (range): Water birth: 24.0 (15.8-41.1) Land birth: 24.0 (16-39.4) Active management of the third stage of labour: Water birth: Yes N=176; No N=216				

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
	Land birth: Yes N=217; No N=166 Perineal compression: not reported				
Bovbjerg 2022 Study type: Retrospective cohort study Setting: Home and birth centre within community Location: USA Funding source: The United States Department of Health & Human Services, the J. William Fulbright Scholarship Board and the Fulbright	N=35060 Water birth: N=17530 Land birth: N=17530 Women who gave birth at home or in a birth centre (low-risk births in community) (gestation age: 281.1 days in water birth group, 281 days in land birth group) Maternal age in years; mean (95% CI): Water birth: 30.7 (30.6-30.7) Land birth: 30.7 (30.6-30.7)	Water birth Under water birth	Land birth Unexposed to water birth	• Perineal trauma (third/fourth-degree tear) (at birth) • Neonatal mortality (through 27 complete days) • Postpartum haemorrhage (defined as "Diagnosed with haemorrhage in 3rd or 4th stage of labour") • Neonatal unit admission (in the first 6 weeks) • Neonatal unit admission - Neonatal infection (in the first 6 weeks)	In addition to matching, logistic regression was used to control for over 80 demographic and pregnancy risk covariables, including maternal age, race/ethnicity, parity, and socioeconomic factors (such as maternal education and insurance), but birthweight and other important socio-economic factors were not adjusted for

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
Commission in Ireland	Parity; % (95% CI)*: Primiparous: Water birth: 26.5 (26.2-26.7) Land birth: 26.4 (26.1-26.6) Ethnicity; % (95% CI)***: White: Water birth: 86.5 (86.2-86.7) Land birth: 86.5 (86.3-86.7) BMI in kg/m^2; (% (95% CI) reported for different BMI groups): Water birth: <25 kg/m^2: 64.6 (64.2-64.9) 25-30 kg/m^2: 19.0 (18.7-19.3) 30-<35 kg/m^2: 6.9 (6.6-7.0) 35+ kg/m^2: 3.4 (3.3-3.6)			• Neonatal unit admission - Respiratory distress syndrome** • Snapped umbilical cord (umbilical cord avulsion) (at birth) **Follow-up period not reported	

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
	Missing: 6.2 (6.0-6.3) Land birth: <25 kg/m^2: 64.7 (64.4-64.9) 25-30 kg/m^2: 19.0 (18.8-19.2) 30-<35 kg/m^2: 6.8 (6.7-7.0) 35+ kg/m^2: 3.4 (3.3-3.5) Missing: 6.1 (6.0-6.3) Active management of the third stage of labour: not reported Perineal compression: not reported *Data only reported for primiparous ***Data only reported for white ethnicity				
Sanders 2024	N=60402 Water birth: N=39627	<u>Water birth:</u>	<u>Birth out of water</u>	• Perineal trauma (OASI or	Adjusted for year and quarter of birth, ethnicity, socio-

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
Study type: Prospective cohort study Retrospective cohort study Setting: Home, midwifery-led unit, and obstetric unit (hospital and community) Location: UK Funding source: The National Institute for Health and Care Research (NIHR)	Birth out of water: N=20775 Women without antenatal or intrapartum risk factors that indicate that birth in an obstetric unit should be recommended (gestation age between 37^{+0} and 41^{+6} weeks) Maternal age in years; mean (SD): Water birth: 29.9 (5.0) Birth out of water: 28.8 (5.2) Parity: Water birth: Nulliparous N=15176 Multiparous N=24451 Birth out of water: Nulliparous N=12210 Multiparous N=8565	Water immersion during labour and birth (giving birth in water)	Leaving the water before birth	third/fourth-degree tear) (at birth) • Fetal and neonatal mortality (in labour or before discharge home) • Postpartum haemorrhage (≥500 ml, ≥1000 ml, ≥1500 ml)** • Neonatal unit admission** • Neonatal unit admission - Respiratory support** • Neonatal unit admission - Administration of intravenous antibiotics commenced within 48 h of birth • Snapped umbilical cord (before clamping) (at birth)	economic status or deprivation quintile, maternal age, gestational age, parity, maternal body mass index, birthweight, and concern identified by midwife before birth

Study details	Population	Intervention	Comparator	Outcomes	Adjusted Covariates
	Ethnicity: White, Asian or Asian British, Black or Black British or Caribbean or African, Mixed or multiple ethnic groups, and Other ethnic groups BMI in kg/m^2; mean (SD): Water birth: 24.3 (3.7) Birth out of water: 24.0 (3.8) Active management of the third stage of labour: not reported Perineal compression: not reported			**Follow-up period not reported	

Abbreviations: BMI: body mass index; CI: confidence interval; NHS: The National Health Service; OASI: obstetric anal sphincter injury; SD: standard deviation

See **appendix D** in the technical appendices document for full evidence tables.

1.1.5 Summary of effectiveness evidence

Informative statements, that were adapted from GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) Guidance 26, were used to summarise the evidence. An example of how these informative statements were drafted is provided in **appendix J** in the technical appendices document.

Water birth vs Birth out of water (Nulliparous women)

Evidence is very uncertain about the effect of water birth on perineal trauma (third-degree or fourth-degree tear at birth) compared to birth out of water (Clinical importance: uncertain effect; Certainty of evidence: low) (Sanders 2024).

Other outcomes were not reported according to parity.

Water birth vs Birth out of water (Multiparous women)

Evidence suggests that water birth may reduce perineal trauma (third-degree or fourth-degree tear at birth) compared to birth out of water (Clinical importance: evidence of benefit; Certainty of evidence: low) (Sanders 2024).

Other outcomes were not reported according to parity.

Water birth vs Birth out of water (Nulliparous and multiparous women)

1. Perineal trauma (third-degree or fourth-degree tear at birth)
    - Evidence shows that water birth probably results in little to no difference in perineal trauma (third-degree or fourth-degree tear at birth) compared to birth out of water (Clinical importance: uncertain effect; Certainty of evidence: moderate) (Aughey 2021, Bovbjerg 2022)
    - Evidence suggests that water birth may reduce perineal trauma (third-degree or fourth-degree tear at birth) compared to birth out of water (Clinical importance: evidence of benefit; Certainty of evidence: low) (Sanders 2024)
    - Evidence is very uncertain about the effect of water birth compared to birth out of water on perineal trauma (third-degree or fourth-degree tear

at birth) (Clinical importance: uncertain effect; Certainty of evidence: very low) (Bailey 2020)

2. Fetal and neonatal mortality
    - Evidence is very uncertain about the effect of water birth compared to birth out of water on:
        - Fetal and neonatal mortality (perinatal death) (follow-up period not reported) (Clinical importance: uncertain effect; Certainty of evidence: low) (Bailey 2020)
        - Fetal and neonatal mortality (in labour or before discharge home) (Clinical importance: uncertain effect; Certainty of evidence: very low) (Sanders 2024)
        - Neonatal mortality (through 27 complete days) (Clinical importance: uncertain effect; Certainty of evidence: very low) (Bovbjerg 2022)
3. Postpartum haemorrhage
    - Compared to birth out of water, evidence suggests that water birth may reduce (Clinical importance: evidence of benefit; Certainty of evidence: low):
        - Postpartum haemorrhage (≥500 ml) (follow-up period not reported) (Sanders 2024)
        - Postpartum haemorrhage (major: ≥1000 ml) (follow-up period not reported) (Sanders 2024)
        - Postpartum haemorrhage (major: ≥1500 ml) (follow-up period not reported) (Aughey 2021, Sanders 2024)
    - Evidence is very uncertain about the effect of water birth compared to birth out of water on:
        - Postpartum haemorrhage (minor: 500-1000 ml) (follow-up period not reported) (Clinical importance: uncertain effect; Certainty of evidence: low) (Bailey 2020)
        - Postpartum haemorrhage (major: >1000 ml) (follow-up period not reported) (Clinical importance: uncertain effect; Certainty of evidence: very low) (Bailey 2020)

- Postpartum haemorrhage (defined as "Diagnosed with haemorrhage in 3rd or 4th stage of labour" by the study, regardless of estimated blood loss) (Clinical importance: evidence of benefit; Certainty of evidence: very low) (Bovbjerg 2022)

4. Neonatal unit admission
    - Compared to birth out of water, evidence suggests that water birth may reduce (Clinical importance: evidence of benefit; Certainty of evidence: low):
        - Neonatal unit admission (follow-up period not reported) (Aughey 2021, Sanders 2024)
        - Neonatal unit admission (respiratory distress syndrome) (follow-up period not reported) (Bovbjerg 2022)
        - Neonatal unit admission (respiratory support) (follow-up period not reported) (Sanders 2024)
        - Neonatal unit admission (administration of intravenous antibiotics commenced within 48 h of birth) (Sanders 2024)
    - Evidence is very uncertain about the effect of water birth compared to birth out of water on (Clinical importance: uncertain effect; Certainty of evidence: low or very low):
        - Neonatal unit admission (in the first 6 weeks or follow-up period not reported) (Bovbjerg 2022, Bailey 2020)
        - Neonatal unit admission (neonatal infection in the first 6 weeks) (Bovbjerg 2022)
5. Snapped umbilical cord (cord avulsion at birth)
    - Evidence is very uncertain about the effect of water birth compared to birth out of water on snapped umbilical cord (cord avulsion at birth) (Clinical importance: evidence of disbenefit; Certainty of evidence: very low) (Sanders 2024).
    - Evidence suggests that water birth may increase snapped umbilical cord (cord avulsion at birth) compared to birth out of water (Clinical importance: evidence of disbenefit; Certainty of evidence: low) (Bovbjerg 2022).

Note: Some outcomes appear more than once because the included studies reported results using different statical approaches (e.g., non-inferiority analysis, adjusted estimates, unadjusted estimates) and were not pooled because of these methodological differences.

See **appendix F** in the technical appendices document for a GRADE summary table containing full details for all outcomes.

1.1.6 Economic evidence

1.1.6.1 Included studies

A search was performed to identify published economic evaluations of relevance to this review question. See the literature search strategy in **appendix B** in the technical appendices document. The search returned 48 studies, excluding duplicates, of which 44 could be excluded at title and abstract.

One economic study was identified which was applicable to this review question. (see economic study selection flow chart in **appendix G** in the technical appendices document).

One Canadian study (Poder 2017) compared water immersion during labour and birth to no water immersion in labouring women. Characteristics of the included economic study is summarised in Table 3.

Full details of the study are provided in the economic evidence study extraction tables in appendix H in the technical appendices document. This study was initially rated as potentially serious limitations. However, during the committee meeting the committee highlighted various outcomes and downstream costs which were not included within this study. As a result, Poder 2017 was downgraded to very serious limitations after the committee meeting. This study has still been included within the economic evidence because it was presented to the committee even though it was unable to be used as part of the decision-making.

1.1.6.2 Excluded studies

See **appendix I** in the technical appendices document for a list of excluded economic studies, with reason for exclusion.

Table 3: Summary of characteristics of included economic studies

Study details	Study design and type of analysis	Population	Interventions and comparators	Perspective	Primary outcome	Time horizon
Poder 2017 Canada	Study design: A decision tree with microsimulations of representative labouring women Type of analysis: Cost-analysis	Labouring women	Water immersion using a pool or water immersion using a bath compared with no water immersion	Quebec health network	Included costs associated with perineal tears and analgesic requirements, capital costs of the pool/bath per birth and the additional supervision of labour time for waterbirth	Short time horizon, the analysis only considers costs incurred during childbirth

1.1.7 Summary of economic evidence

See Table 4 for a summary of the economic evidence and **appendix H** in the technical appendices document for the economic evidence study extraction tables.

Table 4: Economic evidence summary table: Water immersion during the second stage of labour versus no water immersion during labour or standard care or water immersion during the first stage only

Study	Applicability and limitations	Incremental cost[1]	Incremental effects	Cost effectiveness[1]	Uncertainty[1]	Economic evidence statement
Poder 2017	Partially applicable[2] Very serious limitations[3]	Compared with no water immersion: Based on 5-hour labour duration and 10 percentage points less for epidural. Water pool: £101 Water bath: £94 Cost year: 2014	No outcomes reported, assumed reduced cost of £2.39 associated with third and fourth degree tears.	Not applicable	Four scenarios were explored based on the duration of labour and percentage reduction in epidural usage associated with water immersion. Compared with no water immersion: Based on 5-hour labour duration and 5 percentage points less for epidural: Immersion using a pool: £109 Immersion using a bath: £102 7-hour labour duration and 5 percentage points less for epidural: Immersion using a pool: £155 Immersion using a Bath: £148	• Compared with no water immersion during childbirth, water immersion is associated with an increased cost of £101 for using a water pool and £94 for using a water bath. • Cost-effectiveness of water immersion during childbirth is unclear.

Study	Applicability and limitations	Incremental cost[1]	Incremental effects	Cost effectiveness[1]	Uncertainty[1]	Economic evidence statement
					7-hour labour duration and 10 percentage points less for epidural: Immersion using a pool: £147 Immersion using a Bath: £139 Average increased cost associated with waterbirth (assuming half use pool, half use bath) £125 95% CI: £124 to £125	

1. Canadian dollars were converted to pound sterling using IMF Purchasing Power Parities: *https://eppi.ioe.ac.uk/costconversion/default.aspx*.

2. Canadian healthcare system, only intervention costs are included, no outcomes are included, however it includes costs associated with the perineal outcome, costs are from 2014

3. Does not include all relevant outcomes, only costs associated with perineal tears are included which are related to outcomes, only short term costs are reported, does not include a measure of the newborn's health status nor does it include episiotomies or the duration of hospital stay, the clinical data which underpin the costs are not reported, the description of the method of the simulation is unclear.

1.1.8 Economic model

No original economic modelling was completed for this review question.

1.1.9 Committee discussion and interpretation of the evidence

The outcomes that matter most

Mode of birth (spontaneous vaginal birth, instrumental birth and caesarean birth), perineal trauma (third-degree or fourth-degree tear), and fetal and neonatal mortality were prioritised as primary outcomes by the committee because they are important measures of the effects and safety of water birth and can have a significant impact on both mother and baby.

Maternal satisfaction, postpartum haemorrhage (minor: 500-1000 ml; major: >1000 ml), neonatal unit admission, hypoxic-ischaemic encephalopathy, and snapped umbilical cord (cord avulsion) were considered as secondary outcomes as they may be associated with water birth and provide meaningful information about the effects and safety of water birth. Maternal satisfaction was highlighted as an important indicator of quality of care and reflects how satisfied women and pregnant people are with water birth. Evidence was available for all these outcomes except for mode of birth, maternal satisfaction, and hypoxic-ischaemic encephalopathy.

The quality of the evidence

The quality of evidence was assessed using GRADE methodology. The quality of evidence ranged from very low to moderate quality. The main reasons for downgrading were risk of bias, inconsistency and imprecision. Risk of bias was most commonly because of failing to provide clear information on intervention (for example, no clear information on type of pool, water temperature, duration of immersion in water, and stage of labour) and failing to adjust for prespecified covariates (for example, birthweight). The evidence from single studies was downgraded for inconsistency by one level because single study outcomes might otherwise receive favourable ratings for inconsistency by default. The evidence was downgraded for imprecision by two levels where the ratio of the upper to lower boundary of the confidence interval was more than 2.5 for odds ratios or 3 for risk ratios.

Benefits and harms

The intrapartum care guideline (NG235) already recommended the option to labour in water for pain relief but in terms of giving birth in water (water immersion in the second stage of labour), the recommendation from 2007 was that there is insufficient evidence to support or discourage water birth and the committee now reviewed new evidence.

The committee reviewed evidence from four observational studies (two from the UK and two from the USA) on water birth in low-risk, term, singleton pregnancies. The committee noted that the evidence was generally of low to very low certainty, but consistent in direction for several outcomes suggesting potential benefits of water birth. These included reduced rates of severe perineal trauma (third- and fourth-degree tears), postpartum haemorrhage (PPH), and neonatal unit admission. An increased risk of umbilical cord snapping before cord clamping was also noted. The committee acknowledged that not having major disbenefits is positive in itself because it shows that water birth generally seems at least as safe as birth out of water. Therefore, the committee considered the net benefit to be positive, particularly given the alignment with women's preferences and the feasibility of implementation in many settings based on their clinical knowledge and experience.

Regarding perineal trauma, the POOL study (Sanders 2024) showed that water birth might be associated with a lower risk of third- and fourth-degree tears in multiparous women. This finding was supported by stratified analysis and adjustment for parity. The evidence showed mixed results across all women, including both nulliparous and multiparous women, with only one study (Sanders 2024) showing an association between water birth and a lower risk of third- and fourth-degree tears. The committee judged the reduction in severe perineal trauma (third- and fourth-degree tears) to be clinically meaningful given the impact of such trauma on postnatal recovery and quality of life. The evidence was of low certainty, but the consistent direction of effect and the clinical importance of preventing such trauma supported the recommendation. Manual perineal protection, including warm wet compress and perineal massage, was out of the scope of this review, and

the committee were aware that the included studies did not mention anything about manual perineal protection. Based on their clinical knowledge and experience, they noted that manual perineal protection is not typically applied during water birth. Therefore, the committee agreed to amend the existing recommendations in the section on intrapartum interventions to reduce perineal trauma that applying warm wet compress and perineal massage do not apply to water birth.

The committee reviewed the evidence on fetal and neonatal mortality and found it to be very limited and uncertain. Of the three studies reporting this outcome, one reported no fetal and neonatal mortality in either group, while the other two studies showed similar, very low numbers of fetal and neonatal mortality in both water births and births out of water. The committee acknowledged that these studies were not sufficiently powered to detect differences in mortality outcomes. However, the findings were consistent with their clinical experience, which does not suggest an increased risk of neonatal mortality associated with water births. As the certainty of evidence was very low to low, no firm conclusions could be drawn about the impact of water birth on mortality. The committee acknowledged the importance of this outcome but agreed that the available data were insufficient.

In terms of postpartum haemorrhage, the committee noted that three of the four included studies showed a reduction in the incidence of haemorrhage among those who gave birth in water. One smaller study did not show a difference, possibly because of a higher rate of active management of the third stage of labour in the control group. The committee noted that the evidence did not consistently account for third-stage management, which could confound results. Despite this, the consistent direction of effect and clinical relevance led the committee to conclude that water birth may reduce the risk of postpartum haemorrhage. The evidence was of very low to low certainty. The committee emphasised that the lower likelihood of postpartum haemorrhage observed in women giving birth in water does not mean that the baseline risk for those at an increased risk of postpartum haemorrhage would change if they give birth in water. The committee agreed to cross-reference

the existing recommendation on management of third stage of labour to ensure clarity.

The committee found that water birth might be associated with a decreased rate of neonatal unit admission in three large studies. These admissions included cases for respiratory distress, and need for respiratory support and intravenous antibiotics within 48 hours of birth. While acknowledging the low certainty of this evidence, the committee noted that variations in admission criteria across clinical settings could affect the findings. Nonetheless, they regarded the potential reduction in admissions as a meaningful outcome particularly in terms of NHS resource use and parental experience based on their clinical knowledge and experience. They agreed that this benefit should be communicated to women and pregnant people considering water birth.

A potential disbenefit identified was an increase in the incidence of snapping of the umbilical cord before clamping. However, the absolute risk remains small, and the certainty of evidence is low to very low. Based on their clinical experience, the committee noted that while this event is rare, it appears to occur more frequently in water births. They discussed that the mechanism is not fully understood, but it might relate to the movement of the baby or cord tension during emergence from the water. The committee discussed data from the POOL study indicating that among babies with snapped umbilical cords in both intervention and control groups there was a higher rate of neonatal unit admission, neonatal unit admission with respiratory support, and administration of antibiotics within 48 hours of birth compared to babies whose cords were clamped before cutting; however, none of the babies with snapped umbilical cords required therapeutic hypothermia or blood transfusion, and there was no associated increase in neonatal mortality. Importantly, however, the committee noted that despite a higher rate of cord snapping in the intervention group, there was a lower incidence of neonatal unit admission in this group. The committee agreed that this potential increased risk of cord snapping in water should be discussed with women and pregnant people alongside other potential effects as part of informed decision-making.

Overall, the committee concluded that water birth may offer benefits in terms of reduced perineal trauma, lower risk of postpartum haemorrhage, and decreased neonatal unit admissions, with a potential risk of cord snapping. They agreed that these findings supported a positive recommendation to consider water birth for women and pregnant people with low-risk singleton pregnancies, while ensuring that discussions include both the potential benefits and the rare but possible risks.

Considering the evidence on the effects and safety of water birth, the committee concluded that water birth can be an option to be considered. The committee agreed that the recommendation to consider water birth is applicable to all women and pregnant people with low-risk pregnancies, regardless of parity (nulliparous or multiparous), and across all care settings, including home, midwifery-led units and obstetric-led care. They highlighted that water birth may be an appropriate option for a broad range of service users where clinically suitable and where infrastructure permits.

The committee also discussed the practical aspects of water birth, including the availability of birthing pools and the feasibility of implementation. They noted that midwifery-led units (birth centres) generally have more pools than obstetric units, and the latter tend to have only one pool. They emphasised that the recommendation to consider water birth should not be interpreted as requiring all units to provide universal access, but rather to support informed choice where facilities are available.

The committee recognised emergency evacuation procedures as an important consideration. In practice, every unit already has an established evacuation policy, and the committee did not anticipate that a pool would be installed without appropriate contingency measures. Emergency evacuation rehearsals are part of standard operational practice. While acknowledging that emergency evacuation is a well-established and routine practice, the committee emphasised the continued importance of ensuring that appropriate measures remain in place.

The committee also considered equity and access, noting that according to observational evidence from England, women from ethnic minorities and women from less affluent areas are less likely to use water immersion during labour and birth. It is not clear if this is to do with access or preference, but they emphasised the need to ensure equitable access across ethnic and socioeconomic groups and recognised water birth as a sustainable intervention with low resource burden once infrastructure is in place.

The committee discussed the importance of addressing mobility issues and agreed that women and pregnant people with limited mobility should be supported through an individualised assessment. Reasonable adjustments should be made to enable safe access to water during labour and birth, including proactive measures such as staff support or appropriate equipment, similar to hydrotherapy practices. Individuals with limited mobility should not be left alone at any point. This approach reflects existing practices around risk assessment and ensures care is tailored to individual needs rather than based on generalised exclusions.

Cost effectiveness and resource use

The committee considered the cost-effectiveness and resource implications of offering birth in water during the third stage of labour. Safety was the primary focus of the discussion, particularly with regard to severe perineal trauma (3rd or 4th degree tearing), postpartum haemorrhage, neonatal unit admissions and cord management. While the recommendation was not based on cost-effectiveness, potential benefits and harms identified in the clinical review were noted for their relevance to resource use.

The committee reviewed the economic evidence by Poder 2017 from a Canadian healthcare perspective, which suggested a small cost increase associated with births in water compared to no water immersion. The committee raised concerns around the applicability of the Poder 2017 study given the Canadian health care system is quite different to the UK and the costs will likely be quite different. The committee were concerned that in addition to the main limitation of the study not including outcomes, the costs that were included were limited. Potential savings from reductions in post-

partum haemorrhage and any reduction in neonatal admissions unit was missed, which is likely overestimating the costs associated with water births. The committee acknowledged its findings but noted that it did not include outcomes and did not assess downstream cost offsets. Following committee discussion this study was downgraded to very serious limitations. Therefore, it was not used for decision making.

The evidence suggested that birth in water may be associated with a decreased risk of severe perineal trauma (third- and fourth-degree tears) and postpartum haemorrhage, particularly in multiparous women. A lower rate of admission to neonatal care was also observed. These outcomes have the potential to reduce the need for obstetric intervention, inpatient care, and postnatal treatment, although no formal analysis quantified the associated costs. Cord snapping was identified as a possible harm, requiring prompt recognition and management, but was not linked to identifiable cost implications.

No UK-based modelling was conducted, and the committee did not review specific unit costs for infrastructure, staffing, or consumables. In the absence of formal analysis, the committee made an informal judgement about the feasibility and potential resource implications. Both obstetric units and birthing centres are well equipped with birthing pools and although there is less provision in obstetric units, many do have access to a pool. The committee considered this recommendation to be targeted towards low-risk women for whom a birthing centre would be suitable.

There is not expected to be a substantial resource impact as a result of this recommendation. Given the existing recommendation for the use of birthing pools for managing pain in labour, it is unlikely that someone would want to use a birthing pool just for second stage labour and not the first stage. However, now there is more evidence of safety it could lead to an increase in women choosing to labour and give birth in water who may not have previously. The committee discussed whether there could be a significant increase in the demand for birthing pools which could have resource implications. Overall, the committee considered that whilst there might be

some increase in purchasing of birthing pools, it is anticipated that this will be a small increase and will overall have a limited resource impact especially if this is offset to some extent by a reduction in harms and neonatal admissions.

The committee discussed addressing mobility issues. It was considered that reasonable adjustments which may be required following an individualised needs assessment are likely to already be available in practice and trusts will already have emergency procedures in place. Overall, no significant resource impact is anticipated especially as the population affected by this recommendation is likely to be small.

1.1.10 Recommendations supported by this evidence review

This evidence review supports recommendation 1.6.13 and 1.9.24.

1.1.11 References

1.1.11.1 Effectiveness evidence

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1.1.11.2 Economic evidence

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1.1.11.3 Miscellaneous

Poder TG, Larivière M. Advantages and disadvantages of water birth. A systematic review of the literature. Gynécologie Obs Fertil. 2014;42(10):706–713

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