European Journal of Midwifery

Optimizing maternal autonomy in second-stage labor: A scoping review of upright birth position

Jingjing Zhang[1]*, Sijing Chen[1]*, Xuemei Fan[1], Jingyan Liu[1], Jingjing Hou[1], Liulan Li[1], Xinxin Huang[1]

ABSTRACT

INTRODUCTION Although upright positions during second-stage labor are increasingly promoted for their potential benefits, clinicians still lack evidence-based guidance on how best to implement them. Thus, we synthesized the current evidence to distil practical recommendations for upright deliveries.

METHODS Within this review, a search was conducted across BMJ Best Practice, PubMed, CINAHL, CNKI databases, guideline repositories, and professional association resources from inception to September 2024. Our approach followed the principles of the '6S' evidence hierarchy, prioritizing best clinical practice guidelines, evidence summaries, guidelines, systematic reviews, expert consensus statements, and high-quality primary research studies. Three reviewers independently assessed the methodological quality of included sources using the Appraisal of Guidelines for Research & Evaluation (AGREE) II, Critical Appraisal for Summaries of Evidence (CASE), and the 2016 Joanna Briggs Institute (JBI) Model of Evidence-Based Healthcare assessment tools. All data extraction and synthesis were guided by pre-specified eligibility criteria, which included limiting the inclusion to studies published in English or Chinese. Synthesis followed a scoping review approach.

RESULTS We encompassed 6 clinical practice guidelines, 17 guidelines, 4 evidence summaries, 12 systematic reviews, and 4 randomized controlled trials (RCTs), of which 2 contributed to the final evidence synthesis. From these, we identified recurring themes across nine dimensions, including education, selection, implementation, assessment, staff training, midwife assistance, family involvement, facility setup, and environmental creation, which led to the formulation of 35 best-evidence points.

CONCLUSIONS This review offers a multidimensional framework for safely integrating upright positions into second-stage care. It equips midwives and obstetricians with evidence-informed strategies to enhance care quality.

AFFILIATION
1 Women's Hospital of Nanjing Medical University, Nanjing Maternity and Child Health Care Hospital, Jiangsu Province, China
*Contributed equally

CORRESPONDENCE TO
Xinxin Huang. Women's Hospital of Nanjing Medical University, Nanjing Maternity and Child Health Care Hospital, NO.123 Tianfei Lane, Qinhuai District, Jiangsu Province, China
E-mail: huangxinxin86@163.com
ORCID iD: https://orcid.org/https://orcid.org/0009-0000-8133-6435

KEYWORDS
second-stage labor, upright position, labor management, evidence summary, evidence-based care

Received: 1 April 2025
Revised: 30 August 2026
Accepted: 28 October 2026

Eur J Midwifery 2026;10(November):55 https://doi.org/10.18332/ejm/242263

INTRODUCTION

The second stage is a critical period of labor[1]. The supervision of the birth position during the second stage of labor, as an essential element of delivery management, has a significant influence in encouraging spontaneous birth and enhancing the satisfaction of childbirth[2]. Guidelines for childbirth issued by various international organizations make it abundantly clear that during the second stage of labor, women are encouraged to select their own birth positions, with the upright position being preferred and the supine or lithotomy positions being discouraged[3]. Upright position refers to a position in which the line connecting the centers of the third and fifth lumbar vertebrae is at an angle greater than 45° to the horizontal and the third lumbar vertebra is higher than the fifth lumbar vertebra, including walking, standing, sitting, squatting, and kneeling positions[4]. Clarifying the methods and considerations for performing upright positions during the second stage of labor is an important factor that may affect pregnancy outcome.

Labor in the upright position offers unique anatomical and physiological advantages. The upright position effectively uses fatal gravity to facilitate descent and increase the size of the pelvic outlet, while enhancing uterine contractions and avoiding intrauterine hypoxia by reducing uterine compression of the abdominal aorta and inferior vena cava[5]. Due to these advantages, the upright position during labor may contribute to a smooth vaginal

Published by European Publishing. © 2026 Zhang J. et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0. International License (https://creativecommons.org/licenses/by/4.0/).

delivery and improve outcomes for both mother and infant, especially during the second stage of labor[6]. A Cochrane evaluation of second stage of upright labor positions in women without epidural anesthesia showed a reduction in the ratio of instrumental labor and episiotomy[7]. Gupta et al.[8] also found that the duration of the second stage of labor was significantly shorter using the upright position in women without epidural analgesia.

Studies investigating the management of the second stage of labor while in the upright position have been published throughout the previous few decades[8,9]. Even though the upright position has been given priority by a number of guidelines, the majority of current studies concentrate on assessing the efficacy of interventions for delivery in the upright position, with evidence that is more general and dispersed[8,10]. Additionally, there is a lack of thorough and systematic guidance for clinical practice, which may be confusing to clinical decision-makers when implementing the upright position[11]. To our knowledge, only very few published recommendations have specifically addressed the use of the upright position based on the results of the current study. The optimum way to condense the available implementation options was found to be evidence summary. In order to bridge the research gap, we performed a literature review on laboring in the upright position. We then evaluated and consolidated what was known with the goal of giving midwives and other clinical staff a reference point for instructing pregnant women on how to correctly use the upright position labor technique.

METHODS

Research strategy

This review was guided by the '6S' evidence hierarchy; we searched a range of sources[3,5,6,8,10,12-49] including Computer Decision Making Systems, Guidelines database, Professional Associations and library databases; details can be found in Table 1. Our search combined Medical Subject Headings (MeSH) with free-text terms related to birth positions during the second stage of labor, such as 'maternity/pregnant/delivery/stage of labor/second stage of labor', 'birth position/free position/upright position/seating position/squatting position/semi recumbent position/kneeling position/standing posture/walking/intrapartum management'. Because indexing conventions vary across platforms, we tailored the search syntax for each database (see Supplementary file Table 1 for full strategies). The retrieval period covered the period from the database's creation until September 2024. Evidence was extracted from the included literature, and its original source was then tracked down. During the evidence extraction process, we noted that the primary studies cited by the included evidence sources were all published before January 2019. To ensure that our evidence base reflected the most recent findings, we therefore conducted an additional search for randomized controlled trials (RCTs) published between January 2019 and September 2024. As this study involved secondary analysis of publicly available literature, it was exempt from institutional review board approval.

Inclusion and exclusion criteria

We included studies that addressed the management of upright delivery in the second stage of labor, including implementation strategies, preventive measures, and other related topics, with the research subject being women in the second stage of labor. The following were the inclusion requirements: 1) Literature types included guidelines, best practices, evidence summaries, systematic reviews, practice recommendations, expert consensus, and RCTs; and 2) Languages were limited to Chinese and English. The exclusion criteria were: 1) Duplicate publications from multiple institutions; 2) Translated versions or updated literature; 3) Study type as a research proposal, report, or abstract; and 4) Incomplete information or full text inaccessible.

Selection process

Following PRISMA guidelines, the three reviewers independently screened records using EndNote X9. We first employed its automatic duplicate detection feature to identify potential duplicates, then manually verified and removed 694 duplicate records from an initial pool of 14576 citations. An additional 176 records were excluded for other

Table 1. Literature research databases

Categories	Databases
Computer decision-making systems	UpToDate; British Medical Journal (BMJ) best practice
Guidelines	Queensland Health; World Health Organization (WHO); Registered Nurses' Association of Ontario (RNAO); National Institute for Health; Clinical Excellence (NICE); Scottish Intercollegiate Guidelines Network (SIGN); Guidelines International Network (GIN); National Guideline Clearinghouse (NGC); China Guideline Clearinghouse (CGC); Medlive
Professional associations	American College of Obstetricians and Gynecologists (ACOG); Chinese Maternal and Child Health Association (CMCHA); Obstetrics and Gynecology Branch of Chinese Medical Association (Obstetrics Group)
Library	Cochrane Library; PubMed; SinoMed; Embase; CINAHL; Epistemonikos; CNKI; Wanfang database; Nursing consult; DynaMed

Comprehensive list of databases searched for evidence on upright positions in second-stage labor management, showing initial hits and duplicate removal. Searches covered publications from database inception to September 2024, with additional focus on randomized controlled trials (RCTs) published between January 2019 and September 2024. Search strategies combined MeSH terms and free-text keywords (Supplementary file S1 for full details).

reasons, including full-text unavailability, non-compliance with our eligibility criteria, conference abstracts, and publications in languages other than English or Chinese. Prior to full screening, we calibrated our approach by jointly reviewing a random 20% sample of titles and abstracts, achieving substantial agreement (κ=0.87). The remaining records were then divided among reviewers for independent assessment. Of the 1214 articles retrieved in full text, discrepancies in eligibility judgments were discussed in consensus meetings facilitated by the senior reviewer. Ultimately, 43 publications were included, with exclusions systematically documented and cross-checked against the '6S' evidence hierarchy, ensuring a transparent and reproducible selection.

Evaluation of the literature's quality

The Clinical Appraisal of Guidelines for Research and Evaluation II (AGREE II) was used to assess the guidelines. The Critical Appraisal for Summaries of Evidence (CASE) was utilized for rating evidence summaries. The Joanna Briggs Institute (JBI) Centre for Evidence-Based Health Care's equivalent assessment standards were applied for scoring expert consensus, systematic reviews, and RCTs. Two researchers independently appraised the quality of the literature. Each of the three had been instructed in evidence-based methods, and disagreements were resolved through iterative discussion until consensus was reached.

Evidence integration, extraction, and assessment

Two researchers independently extracted data on intervention components, outcomes, and contextual factors, with a third reviewer auditing a random subset for consistency. When evidence from multiple sources converged, we integrated findings thematically using a descriptive scoping synthesis approach. The synthesized results were organized into evidence summary tables, and no quantitative meta-analysis was performed. In cases of conflict, we prioritized higher quality, more recent, or more authoritative sources. According to the type of study, each piece of evidence was ranked from one to five using the JBI Evidence Preclassification and Recommendation Levels of Evidence (2014), with one representing the greatest level and five the lowest level.

RESULTS

Results of the literature review and general information of included studies

The PRISMA flow diagram-based literature retrieval process is shown in Supplementary file Figure 1. In this study, a total of 14576 articles were retrieved, and 1214 articles were located after two researchers independently investigated the articles' titles and abstracts; 43 articles were eventually included after reading every page of text, encompassing 6 articles[12-17] (14.0%) on clinical decision-making, 4 papers[5,18-20] (9.3%) that provided an evidence summary, 17 articles (39.5%) on guidelines[3,21-36], 12 papers (27.9%)[6,8,10,37-45] that underwent a systematic review and 4 papers (9.3%)[46-49] that were RCTs; the time span of included literature was 2010–2023, of which 65.1% were published after 2020. There were 7 Chinese articles and 36 English articles. Guidelines were sourced from multiple organizations, including Queensland Health (n=6), SOGC (n=2), RCOG (n=2), WHO (n=2), ACOG (n=1), NICE (n=1), and others (n=3). Of the 12 systematic reviews, 4 were from China, and 4 were from Europe. All 4 RCTs were from Asia. Table 2 displays the broad context of the included material.

Results of literature quality evaluation

Quality evaluation results of the best clinical practice guideline

Five[12-16] of the six best clinical practice guidelines were from UpToDate and one[17] from CINAHL. All were judged by three independent reviewers using the CASE tool to be of high methodological quality and suitable for inclusion. It is noteworthy that only one guideline[16] offered a clear hierarchy of evidence and none provided a fully documented search strategy. Overall, these guidelines scored well on transparency and clinical applicability, offering clear, actionable recommendations. However, three critical limitations were identified: 1) None fully reported databases, search terms, or screening processes, raising concerns about reproducibility; 2) 83% did not use a standardized framework like GRADE or JBI to grade evidence; and 3) Particularly in summaries addressing specialized positions (e.g. breech presentation), institutional affiliations may have influenced conclusions. The detailed methodological evaluation of best clinical practice guidelines by CASE is shown in Supplementary file Table 2.1.

Quality evaluation results of the evidence summaries

Four[5,18-20] evidence summaries were utilized, with two from JBI, one from PubMed, and one from CNKI, all deemed high quality. Across the board, they showed strong transparency in authorship, clarity of recommendations, appropriate citations, and applicability to patients across all four topics. Most also featured comprehensive search methods and editorial clarity, though two fell short in disclosing reviewer/editor roles or fully detailing their search protocols. Importantly, all employed graded evidence systems and remained current, unbiased, and clinically pertinent. While minor inconsistencies in reporting persist, the overall methodological rigor is solid. See Supplementary file Table 2.2 for details.

Quality evaluation results of the guidelines

Seventeen guidelines have been employed in this research. Sixteen of the guidelines were rated as 'A' quality and one was rated as 'B' quality based on AGREE II assessment. Performance was strongest in 'Scope and Purpose' (92.59–100%) and 'Clarity of Presentation' (88.89–100%), but more variable in 'Stakeholder Involvement' (56.94–100%) and 'Applicability' (56.94–97.22%). High-quality guidelines excelled in methodological rigor (>95%) and inclusion of practical implementation tools. In contrast, lower scoring guidelines lacked transparent evidence selection and resource analysis. Recurring issues included limited patient

Table 2. General characteristics of included studies (N=43)

Number	Author	Evidence type	Year	Literature theme	Source	Reference
1	Hofmeyr	Best clinical practice guideline	2022	Delivery of the singleton fetus in breech presentation	UpToDate	12
2	Funai and Norwitz	Best clinical practice guideline	2022	Labor and delivery: management of the normal second stage	UpToDate	13
3	Stuebe	Best clinical practice guideline	2022	Continuous labor support by a doula	UpToDate	14
4	Ehsanipoor and Satin	Best clinical practice guideline	2021	Labor: diagnosis and management of a prolonged second stage	UpToDate	15
5	Caughey and Tilden	Best clinical practice guideline	2021	Nonpharmacologic approaches to management of labor pain	UpToDate	16
6	Hofmeyr and Singata-Madliki	Best clinical practice guideline	2020	The second stage of labor	CINAHL	17
7	Gimovsky and Berghella	Evidence summary	2022	Evidence-based labor management: second stage of labor (part 4)	PubMed	5
8	Moola	Evidence summary	2021	Perineal trauma: childbirth	JBI	18
9	Minooee	Evidence summary	2021	Labor: second stage	JBI	19
10	Feng et al.	Evidence summary	2021	Best evidence summary of nursing measures in the second and third stages of normal delivery (Chinese)	Wanfang database	20
11	Queensland Clinical Guidelines	Guideline	2023	Intrapartum pain management	Queensland	21
12	Queensland Clinical Guidelines	Guideline	2022	Normal birth	Queensland	22
13	Queensland Clinical Guidelines	Guideline	2022	Rheumatic heart disease and pregnancy	Queensland	23
14	Queensland Clinical Guidelines	Guideline	2021	Obesity and pregnancy (including post bariatric surgery)	Queensland	24
15	Dore and Ehman	Guideline	2020	Fetal health surveillance: Intrapartum consensus guideline (SOGC)	Medlive	25
16	Chinese Maternal and Child Health Care Association Midwife Branch	Guideline	2020	Clinical practice guideline of normal birth (Chinese)	Medlive	26
17	Murphy et al.	Guideline	2020	Assisted vaginal birth (RCOG)	Medlive	27
18	Ministry of Public Health Qatar	Guideline	2020	Antenatal, intrapartum and postnatal care in low-risk pregnancy	GIN	28
19	Queensland Clinical Guidelines	Guideline	2019	Intrapartum fetal surveillance (IFS)	Queensland	29
20	Queensland Clinical Guidelines	Guideline	2018	Perineal care	Queensland	30
21	WHO 2018	Guideline	2018	Intrapartum care for a positive childbirth experience	WHO	3
22	American College of Obstetricians and Gynecologists' Committee on Obstetric Practice	Guideline	2017	Approaches to limit intervention during labor and birth (ACOG)	Medlive	31
23	Impey et al.	Guideline	2017	Management of breech presentation (RCOG)	Medlive	32
24	Lee et al.	Guideline	2016	Management of spontaneous labor at term in healthy women (SOGC)	Medlive	33
25	Roberts et al.	Guideline	2014	Intrapartum care for healthy women and babies (NICE)	GIN	34

Continued

Table 2. Continued

Number	Author	Evidence type	Year	Literature theme	Source	Reference
26	WHO 2014	Guideline	2014	WHO recommendations for augmentation of labor	WHO	36
27	Mambourg et al.	Guideline	2010	Guideline relative to low-risk birth (Belgian Health Care Knowledge Centre)	GIN	35
28	Zang et al.	Systematic review	2021	Benefits and risks of upright positions during the second stage of labor: an overview of systematic reviews	CINAHL	6
29	Zang et al.	Systematic review	2020	Effects of upright positions during the second stage of labor for women without epidural analgesia: a meta-analysis	CINAHL	37
30	Mirzakhani et al.	Systematic review	2020	The effect of maternal position on maternal, fetal and neonatal outcomes: a systematic review	CINAHL	38
31	Healy et al.	Systematic review	2020	How do midwives facilitate women to give birth during physiological second stage of labor? A systematic review	CINAHL	39
32	Dokmak et al.	Systematic review	2020	Squatting position in the second stage of labor: a systematic review and meta-analysis	CINAHL	40
33	Berta et al.	Systematic review	2019	Effect of maternal birth positions on duration of second stage of labor: systematic review and meta-analysis.	CINAHL	41
34	Ying et al.	Systematic review	2018	Influence of different delivering positions on perineal outcomes: a systematic review (Chinese)	CNKI	42
35	Jin et al.	Systematic review	2019	Effects of 7 positions in the second stage of labor: a network meta-analysis (Chinese)	CNKI	43
36	Barrowclough et al.	Systematic review	2022	Maternal postures for fetal malposition in labor for improving the health of mothers and their infants	Cochrane	44
37	Gupta et al.	Systematic review	2017	Position in the second stage of labor for women without epidural anesthesia	Cochrane	8
38	Rocha et al.	Systematic review	2020	Upright positions in childbirth and the prevention of perineal lacerations: a systematic review and meta-analysis	Epistemonikos	45
39	Walker et al.	Systematic review	2018	Maternal position in the second stage of labor for women with epidural anesthesia	PubMed	10
40	Zhu et al.	RCT	2021	Clinical application of vertical position combined with lateral position for promoting natural delivery (Chinese)	SinoMed	46
41	Shedmake and Wakode	RCT	2021	A hospitalbased randomized controlled trial—Comparing the outcome of normal delivery between squatting and lying down positions during labor	PubMed	47
42	Feng	RCT	2020	Application effect of different posture nursing for the full-term pregnancy and delivery of elderly parturient women with continuous occipitotransverse position and occipitoposterior position (Chinese)	SinoMed	48
43	Wang et al.	RCT	2020	Study on the effect of standing forward tilt and pelvic swing in the second stage of labor (Chinese)	Wanfang database	49

JBI: Joanna Briggs Institute. GIN: Guidelines International Network. WHO: World Health Organization. ACOG: American College of Obstetricians and Gynecologists. NICE: National Institute for Health and Care Excellence. RCOG: Royal College of Obstetricians and Gynecologists. SOGC: Society of Obstetricians and Gynecologists of Canada. WHO: World Health Organization. RCT: randomized controlled trial.

Table 3. Methodological quality assessment of included guidelines using AGREE II (N=17)

Guidelines	Source	Standardized scores in each area (%)						≥60% field number n	≤30% field number n	Quality
		Scope and purpose	Involved personnel	Preciseness of guideline development	Clarity of presentation	Applicability	Independence of writing			
Intrapartum pain management[21]	Queensland	92.59	100.00	87.50	100.00	94.44	100.00	6	0	A
Normal birth[22]	Queensland	100.00	98.15	88.19	100.00	77.78	91.67	6	0	A
Rheumatic heart disease and pregnancy[23]	Queensland	92.59	92.59	86.81	94.44	94.44	94.44	6	0	A
Obesity and pregnancy (including post bariatric surgery)[24]	Queensland	100.00	94.44	86.81	98.15	95.83	97.22	6	0	A
Fetal health surveillance: intrapartum consensus guideline[25]	Medlive	100.00	90.74	89.58	90.74	80.56	97.22	6	0	A
Clinical practice guideline of normal birth (Chinese)[26]	Medlive	100.00	96.30	63.89	88.89	56.94	80.56	5	0	B
Assisted vaginal birth[27]	Medlive	98.15	90.74	87.50	100.00	93.06	100.00	6	0	A
Antenatal, intrapartum and postnatal care in low risk pregnancy[28]	GIN	100.00	100.00	95.14	98.15	75.00	91.67	6	0	A
Intrapartum fetal surveillance (IFS)[29]	Queensland	98.15	90.74	83.33	96.30	93.06	100.00	6	0	A
Perineal care[30]	Queensland	98.15	98.15	90.97	98.15	93.06	91.67	6	0	A
Intrapartum care for a positive childbirth experience[3]	WHO	100.00	100.00	96.53	100.00	97.22	100.00	6	0	A
Approaches to limit intervention during labor and birth[31]	Medlive	100.00	94.44	90.97	100.00	83.33	100.00	6	0	A
Management of breech presentation (RCOG)[32]	Medlive	100.00	94.44	85.42	100.00	83.33	86.11	6	0	A
Management of spontaneous labor at term in healthy women[33]	Medlive	100.00	96.30	88.19	94.44	63.89	88.89	6	0	A
Intrapartum care for healthy women and babies[34]	GIN	94.44	94.44	81.94	94.44	83.33	86.11	6	0	A
WHO recommendations for augmentation of labour[36]	WHO	100.00	100.00	93.06	100.00	88.89	100.00	6	0	A
Guideline relative to low risk birth[35]	GIN	98.15	96.30	97.22	90.74	79.17	94.44	6	0	A

Quality scores of 17 clinical guidelines evaluated via AGREE II instrument across six domains (scope/purpose, stakeholder involvement, rigor of development, etc.). Scores are reported as percentages. *Number of domains in which a guideline scored ≥60% or ≤30%. Quality A: all six domains scored ≥60%; B: ≥3 domains scored between 30% and 60%; C: ≥3 domains scored <30%. Of the 17 guidelines, 16 were rated A and 1 was rated B due to an applicability domain score <60%.

involvement (50% of guidelines), weak linkage between evidence and recommendations (30%), and absent update mechanisms (40%). The results of the methodological evaluation of the guidelines are detailed in Table 3.

Quality evaluation results of the systematic reviews

A total of twelve systematic reviews were included, with two[8,44] from the Cochrane Library, six[7,37-41] from CINAHL, one[11] from PubMed, one[45] from Epistemonikos and two[42,43] from CNKI. The JBI appraisal of 12 systematic reviews on maternal positions during the second stage of labor indicated that all studies clearly stated research questions, applied appropriate inclusion criteria, and used rigorous data extraction, with recommendations aligned to evidence and future research. However, 30% of studies had incomplete search resources, 25% omitted publication bias assessment, one study lacked dual-reviewer appraisal 45, and one study ambiguously described synthesis methods[39]. Further details appear in Supplementary file Table 2.4.

Quality evaluation results of the RCTs

Because the systematic reviews we identified mostly drew on studies published before January 2019, we supplemented the evidence base with 19 RCTs published between January 2019 and September 2024. Ultimately, four RCTs[46-49] were used to assess the quality of the literature using the JBI instrument. As expected for non-pharmacological interventions involving positioning, none employed blinding. The implementation protocol for allocation concealment in the study by Zhu et al.[46] was not clearly described, and the study by Shedmake and Wakode[47] did not describe in detail how the randomization grouping was conducted and the allocation concealment; considering the more complete design and overall superior quality of these two studies, inclusion was granted. The studies conducted by Feng[48] and Wang et al.[49] were excluded because they lacked reasonable research designs, failed to execute stochastic grouping and allocation concealment, and failed to adequately characterize the therapies. Ultimately, only 2 of the 4 RCTs were deemed methodologically sound enough to contribute evidence points to the final synthesis. Full appraisal results are available in Supplementary file Table 2.5.

Result of evidence summary

After a thorough process of literature retrieval, quality evaluation, evidence extraction, and grading, we identified 35 usable pieces of evidence. Through inductive analysis, these were synthesized into nine overarching themes: education, selection, implementation, assessment and monitoring, staff training, midwife assistance, family

Table 4. Evidence-based strategies for upright positions in second-stage labor: classification and recommendation levels

Categories	Evidence contents	Evidence level
Education level	1. The advantages and risks of an upright delivery during labor should be properly informed to pregnant women.	1a
	2. The pregnant woman should be informed about the potential benefits and risks associated with different delivery positions before making a decision. This allows her to make an informed choice.	1b
	3. Women should be encouraged to choose the childbirth position that they find most comfortable and taught about all available positions, encouraging them to choose each one voluntarily.	1c
	4. Whether or not epidural analgesia is used, women should be informed of the benefits of upright delivery and encouraged to choose the most comfortable upright delivery position.	1a
Selection	5. An upright delivery position should be taken according to the mother's wishes.	5b
	6. In the second stage of labor, it is recommended that women do not take a supine or semi-supine position.	5b
	7. Support women giving birth by facilitating comfortable position in which the genital structures can be clearly observed.	1b
	8. Midwives and obstetricians are encouraged to apply upright positions depending on women's preferences and labor progress but should take measures to prevent perineal trauma.	5b
	9. If no fetal manipulation or complications are anticipated, parturients should push in almost any position that they find comfortable.	1c
Implementation	10. Attention should be paid to the length of time a woman spends in a certain position. Prolonged use of the birth stool, sitting, lithotomy and squatting positions should be avoided.	1b
	11. When combined with delayed pushing, maternal position changes every 20–30 minutes in passive second stage to assist birth.	1c
	12. Do not advocate delivery bed too early, it is recommended that it is safer during the head visible on vulval gapping.	5b
	13. When need for fetal manipulation or when optimal surgical exposure is anticipated, however, a semi-recumbent position (trunk tilted forwards up to 30 degrees to the horizontal) or lithotomy position is advantageous.	1c

Continued

Table 4. Continued

Categories	*Evidence contents*	*Evidence level*
	14. Women can stand or kneel and lean their upper bodies over the ball, which can provide comfortable support of the torso or back.	1a
	15. Placing the ball beneath the upper leg of the side-lying parturient using epidural analgesia to shorten their labor.	1c
	16. Encourage overweight women to remain mobile with adequate rest periods, moving requires extra effort and difficulty may cause embarrassment. Provide emotional support to women.	5b
	17. Maternal mobility can be limited when women are connected to equipment, unable to support themselves due to pain medication, or asked to limit movement because of the need for monitoring or because of institutional culture or provider preferences.	4b
	18. Squatting may be offered to women in the second stage of labor in cases where accelerated labor may be required.	1c
	19. Besides self-initiated comfort-seeking movements, caregivers can suggest specific positions to accelerate labor progress or correct a fetal or maternal problem (e.g. fetal heart rate decelerations or malposition, maternal hypotension). No one position is advised.	5b
	20. It is recommended to encourage the parturient to adopt the position that she finds the most comfortable for pushing, provided the fetal heart rate remains normal. When the fetal heart rate is less than 100 times/min or more than 160 times/min, the pregnant woman should be instructed to lie on the left side or change the position, take oxygen, dynamically detect fetal heart changes, and notify the doctor.	5b
	21. Pregnant women with combined rheumatic heart disease push in left lateral rather than supine, lessens cardiovascular changes and improves preload. Avoid prolonged lithotomy positioning.	5b
Assessment and monitoring	22. Upright positions are recommended to be used depending on women's preferences and labor progress, but should also be carefully monitored especially in women with epidural analgesia.	5b
	23. BMI greater than 40 kg/m2 recommend continuous fetal monitoring (CFM). Wireless/beltless monitoring may enhance the woman's comfort and mobility.	5b
	24. Discuss the woman's plans and support normal birth strategies following neuraxial analgesia. Follow local protocols to support active positioning/mobility after an individual mobility assessment, including: 1) Bilateral straight leg raises against resistance; 2) Supervised stepping on a step stool with either leg and taking a step; 3) Satisfactory trial of walking with a clinician. Always accompany when repositioning (to a weight bearing position) or mobilizing. If immobile, incorporate pressure injury prevention strategies.	5b
	25. Ambulation remains an important component of care during labor when electronic fetal monitoring (EFM) is being used. When possible, support maternal upright positions, ambulation (such as with the patient standing beside the bed, squatting, kneeling) and hydrotherapy. Where available, use wireless and waterproof technology that allows position changes, hydrotherapy, and movement during labor and pushing.	1b
	26. Women with back pain should be advised to avoid maintain an upright posture.	5b
	27. Frequent position changes during labor to enhance maternal comfort and promote optimal fetal positioning can be supported as long as adopted positions allow appropriate maternal and fetal monitoring and treatments and are not contraindicated by maternal medical or obstetric complications.	5b
Staff training	28. Health care professionals accustomed to supporting women to give birth in recumbent positions would require training on how to support women to give birth in an upright position.	5b
Midwife assistance	29. Midwives provide neutral counselling to women in labor positions.	1c
	30. Support from the midwife is important for the correct and consistent use of the upright position during labor.	1c
	31. Midwives attends to the physical comfort of the pregnant woman by providing assistance with positioning.	1a
Family engagement	32. Family members are encouraged to attend the birth.	5b
Facility configuration	33.Provide space and equipment to support use of active positioning and movement, such as bed bars, birth chair or stool, birth ball, cushion, etc.	1c
	34.Upright positions do not necessarily require additional props (e.g. birth cushions).	5b
Environment creation	35. Reduce environmental disturbances and allow pregnant women to change positions and rest.	5b

JBI evidence levels: Level 1 = experimental designs (RCTs and their syntheses); Level 2 = quasi-experimental; Level 3 = observational (cohort/case-control); Level 4 = case series/reports; Level 5 = expert opinion/consensus. Within each level, the sub-letters (a, b, c, d) denote specific study designs: a = systematic reviews of the respective study type; b = individual studies of that type; c = quasi-experimental or controlled non-randomized studies; d (where applicable) = case series or case reports. Full definitions are detailed in the JBI 2014 framework. Synthesis of 35 evidence items into 9 practice categories, with JBI evidence levels (1 = highest, 5 = lowest). Conflicts were resolved by prioritizing higher quality, more recent or more authoritative sources.

engagement, facility configuration, and environment creation. The key points include: 1) Education prioritization (Evidence Level 1a–1c), focusing on informed choice and maternal autonomy; 2) Adaptive implementation, adjusting positions based on maternal preference with risk monitoring; 3) Support measures, such as access to equipment (e.g. birth stools, exercise balls), targeted staff training, and active family engagement; 4) Special population management, including women with epidural analgesia, obesity or coexisting medical conditions; and 5) Evidence variability, with stronger evidence in education (Evidence Level 1a) and operational guidance relying on expert consensus (Level 5b). The levels of evidence and the recommendation level are shown in Table 4.

DISCUSSION

We interpret the main findings of our evidence synthesis on upright positions in the second stage of labor, focusing on four key themes: informed choice, implementation safety, support systems, and evidence gaps.

Providing pregnant women with information on benefits and risks of labor in upright position

Current evidence highlights the importance of systematically informing pregnant women about the benefits and risks of upright positions during labor (Level 1a). Studies show that upright positions in non-epidural women shorten the second stage, reduce episiotomy rates and decrease instrumental delivery needs, albeit with increased risks of blood loss >500 mL and second-degree perineal tears[8]. In contrast, no consistent benefit or harm has been observed in those receiving epidural analgesia[11]. This divergence suggests that counseling should be tailored: for non-epidural women, education might emphasize labor acceleration and risk mitigation; for those with epidurals, the focus could shift toward safety, comfort, and realistic expectations. Yet, translating this into practice is not straightforward. Information gaps and entrenched cultural norms often hinder implementation. As Zang et al.[50] found, many women weigh perceived risks more heavily than potential gains, and in certain traditional settings, supine birth remains culturally preferred. Various educational approaches have been used to convey this information, though evidence on their effectiveness remains limited[51,52].

Selection and implementation of upright position in the second stage of labor

During the second stage of labor, current evidence supports prioritizing maternal preference for upright positioning while actively discouraging supine/semi-supine positions (Level 5b). When fetal manipulation or complications are not expected, women ought to be supported in choosing positions that feel most comfortable to them (Level 1c). Notably, given the possible increased risk of second-degree perineal laceration, evidence points out that midwives should provide women with comfortable labor positions while keeping genital structures clearly visible and taking measures to prevent perineal laceration (Level 1b). Timing also matters. Prolonged use of the birthing toilet (about 20 minutes) and continuous sitting or squatting positions can cause excessive pressure on the perineal interface (Level 1b). Positional rotation every 20–30 minutes during passive descent, particularly with delayed pushing, has been associated with reduced severe perineal trauma (Level 1c). Still, a notable gap remains: few studies specify the optimal duration of upright positioning during the second stage. This lack of clarity leaves room for individualized, rather than protocol-driven decision-making.

The birthing ball (alternatively termed exercise/Swiss ball) can help women adopt postures that are biomechanically favorable, particularly when used in supported kneeling or standing stances[53]. When hip flexion exceeds 100 degrees, the birthing ball has been shown to reduce lumbar strain by approximately one-third (Level 1a). Complementary use of the peanut ball expands pelvic inlet dimensions by maintaining 30 degrees hip abduction in lateral positions[54].

For fetal heart rate abnormalities (less than 100 times/min or more than 160 times/min), left lateral positioning improves uteroplacental perfusion by reducing aortocaval compression (Level 5b). When there is a need for fetal manipulation or when optimal surgical exposure is anticipated, however, a semi-recumbent position (trunk tilted forwards up to 30 degrees to the horizontal) or lithotomy position is advantageous (Level 1c). Biomechanical reviews list squatting's potential to increase efficiency of uterine contractions and improve fetal alignment and pelvic dimensions40. This postural shift mechanically supports cervical dilation and can help speed up delivery (Level 1c). Women with concomitant rheumatic heart disease are generally advised to bear down in the left lateral position rather than supine, as it lessens cardiovascular changes and improves preload. Prolonged lithotomy is contraindicated (Level 5b). Finally, for overweight pregnant women, midwives should encourage continued physical activity, but with built-in rest intervals. Given the extra physical demand, attention to psychological comfort and perceived exertion is just as important as the exercise itself (Level 5b).

Assessment and monitoring of upright labor position

Prior to implementing upright positions, comprehensive assessment of maternal physical capacity and obstetric requirements is recommended (Level 5b). When continuous monitoring allows, and no contraindications are present, frequent changes in position have been associated with improved maternal comfort and fetal alignment (Level 1b). Given the limited high-quality evidence on the safety of upright positions under epidural, close observation remains critical (Level 1c). Muscle strength assessment, such as leg resistance tests and walking tests, is crucial for pregnant women with epidural analgesia who intend to adopt an upright position (Level 5b). Women experiencing back pain require modified positioning approaches, as sustained upright postures (standing/sitting >30 minutes) may exacerbate discomfort (Level 2b).

Mobility remains a consideration of care during labor

while using electronic fetal monitoring (EFM). When a woman chooses an upright posture, continuous assessment of fetal wellbeing is necessary (Level 1b). However, if a position impedes reliable EFM readings, the trade-offs should be communicated, and support for shifting to a monitor-friendly position may be provided (Level 5b). Conventional EFM may restrict mobility through wired connections, increasing maternal discomfort[55]. Unrestricted walking has been associated with enhanced perceived control and satisfaction, while limited mobility reduces positional options, elevates analgesia requirements, and raises intervention rates, including cesarean deliveries[56].

Adequate support for labor in the upright position

Clinician philosophies influence intrapartum positioning recommendations, with midwives playing a role in supporting and ensuring proper upright position utilization through non-directive counselling and biomechanical support (Level 5b). Implementation barriers include clinicians' knowledge gaps, safety concerns, unmet maternal needs, and insufficient training protocols (Level 4b). Health professionals who are used to supporting women to deliver in the lying-down position need to be trained on how to support an upright position (Level 5b). Family participation has been associated with enhanced maternal perceived control when coordinated with midwifery communication (Level 4b). The birth environment can support or hinder physiological birth. A calm atmosphere can reduce stress hormones. Closed doors, dim lighting, and home-like comforts have been reported as potentially comforting (Level 5b). Thus, a comfortable space and adequate equipment need to be provided to support the use of active positioning and movement, such as bed rails, birthing chairs or stools, birthing balls, cushions, etc. (Level 1b). The use of equipment can help a pregnant woman relax while making multiple position changes. Minimize environmental distractions during upright labor and allow for rest breaks between positions (Level 5b).

Limitations

Although this study summarized more comprehensive evidence on the management of the second stage of labor in the upright position, fewer high-quality original studies were included. Therefore, the findings should be interpreted with caution. None of the included literature introduced the researchers, so the multicultural background, values, and regional ethnic variability of the study population may have influenced the results. Furthermore, we only included eligible reviews published in English and Chinese, which may have omitted some eligible reviews published in other languages. We did not perform a meta-analysis, as the included sources consisted primarily of clinical practice guidelines, evidence summaries, and systematic reviews that were not amenable to quantitative synthesis. The results were synthesized descriptively. Moreover, publication bias cannot be ruled out, as studies with non-significant or unfavorable findings may be under-represented.

CONCLUSION

This study synthesizes 35 pieces of evidence across nine domains (education, selection, implementation, assessment and monitoring, staff training, midwife assistance, family engagement, facility configuration, and environment creation) to guide upright positioning during second-stage labor. It provides an evidence-based basis for healthcare professionals and midwives to help pregnant women adopt the upright position. While strongly recommending upright positioning adoption, standardization gaps persist regarding optimal implementation frequency/duration and operational protocols. Future multicenter trials should establish practice guidelines through expanded sampling and quality improvement initiatives.

REFERENCES

1. Cohen WR, Friedman EA. The second stage of labor. Am J Obstet Gynecol. 2024;230(3S):S865-S875. doi:10.1016/j.ajog.2022.06.014
2. Kopas ML. A review of evidence-based practices for management of the second stage of labor. J Midwifery Womens Health. 2014;59(3):264-276. doi:10.1111/jmwh.12199
3. World Health Organization. WHO recommendations: intrapartum care for a positive childbirth experience; 2018. Accessed October 28, 2026. https://iris.who.int/server/api/core/bitstreams/ba043cf7-cba4-484d-bf7e-ec79c4102d54/content
4. Atwood RJ. Parturitional posture and related birth behavior. Acta Obstet Gynecol Scand Suppl. 1976;57:1-25.
5. Gimovsky AC, Berghella V. Evidence-based labor management: second stage of labor (part 4). Am J Obstet Gynecol MFM. 2022;4(2):100548. doi:10.1016/j.ajogmf.2021.100548
6. Zang Y, Lu H, Zhang H, Huang J, Zhao Y, Ren L. Benefits and risks of upright positions during the second stage of labour: an overview of systematic reviews. Int J Nurs Stud. 2021;114:103812. doi:10.1016/j.ijnurstu.2020.103812
7. Deliktas. A, Kukulu. K. A meta-analysis of the effect on maternal health of upright positions during the second stage of labour, without routine epidural analgesia. J Adv Nurs. 2018;74(2):263-278. doi:10.1111/jan.13447
8. Gupta JK, Hofmeyr GJ, Shehmar M. Position in the second stage of labour for women without epidural anaesthesia. Cochrane Database Syst Rev. 2017;5(5):CD002006. doi:10.1002/14651858.CD002006.pub4
9. Fu L, Zang Y, Li X, et al. The management framework of upright position in the second stage of labour: a qualitative study. Midwifery. 2023;127:103832. doi:10.1016/j.midw.2023.103832
10. Walker KF, Kibuka M, Thornton JG, Jones NW. Maternal position in the second stage of labour for women with epidural anaesthesia. Cochrane Database Syst Rev. 2018;11(11):CD008070. doi:10.1002/14651858.CD008070.pub4
11. Ondeck M. Healthy Birth Practice #2: Walk, move around, and change positions throughout labor. J Perinat Educ. 2019;28(2):81-87. doi:10.1891/1058-1243.28.2.81

12. Hofmeyr GJ. Delivery of the singleton fetus in breech presentation. In: Caughey AB, ed. UpToDate. Wolters Kluwer. Updated September 8, 2025. Accessed October 28, 2026. https://www.uptodate.com/contents/delivery-of-the-singleton-fetus-in-breech-presentation
13. Funai EF, Norwitz ER. Labor and delivery: management of the normal second stage. In: Prabhu M, ed. UpToDate. Wolters Kluwer. Updated August 26, 2025. Accessed October 28, 2026. https://www.uptodate.com/contents/labor-and-delivery-management-of-the-normal-second-stage
14. Stuebe A. Continuous labor support by a doula. In: Barbieri RL, ed. UpToDate. Wolters Kluwer. Updated July 23, 2026. Accessed October 28, 2026. https://www.uptodate.com/contents/continuous-labor-support-by-a-doula
15. Ehsanipoor RM, Satin AJ, FACOG. Labor: diagnosis and management of a prolonged second stage. In: Berghella V, ed. UpToDate. Wolters Kluwer. Updated July 10, 2024. Accessed October 28, 2026. https://www.uptodate.com/contents/labor-diagnosis-and-management-of-a-prolonged-second-stage
16. Caughey AB, Tilden E. Nonpharmacologic approaches to management of labor pain. In: Lockwood CJ, ed. UpToDate. Wolters Kluwer. Updated July 14, 2023. Accessed October 28, 2026. https://www.uptodate.com/contents/nonpharmacologic-approaches-to-management-of-labor-pain
17. Hofmeyr GJ, Singata-Madliki M. The second stage of labor. Best Pract Res Clin Obstet Gynaecol. 2020;67:53-64. doi:10.1016/j.bpobgyn.2020.03.012
18. Moola S. Evidence summary. Perineal trauma: childbirth. JBI; 2021. Report no. JBI-ES-1720-1.
19. Minooee S. Evidence summary. Labor: second stage. JBI; 2021. Report No. JBI-ES-3677-1.
20. Feng J, Yue J, Chen F, et al. [Best evidence summary of nursing measures in the second and third stages of normal delivery]. Chin J Mod Nurs. 2021;27:2449-2453.
21. Queensland Clinical Guidelines. Intrapartum pain management. Queensland Health; 2023. Guideline No. MN23.75-V1-R28. Accessed October 28, 2026. https://www.health.qld.gov.au/__data/assets/pdf_file/0014/1211126/g-intrapartum-pain.pdf
22. Queensland Clinical Guidelines. Normal birth. Queensland Health; 2022. Guideline No. MN22.25-V5-R27. Accessed October 28, 2026. https://www.health.qld.gov.au/__data/assets/pdf_file/0014/142007/g-normalbirth.pdf
23. Queensland Clinical Guidelines. Rheumatic heart disease and pregnancy. Queensland Health; 2022. Guideline No. MN22.40-1-V1-R27. Accessed October 28, 2026. https://www.health.qld.gov.au/__data/assets/pdf_file/0015/1143024/g-rheumatic-heart-disease.pdf
24. Queensland Clinical Guidelines. Obesity and pregnancy (including post bariatric surgery). Queensland Health; 2021. Guideline No. MN21.14-V6-R26.
25. Dore S, Ehman W. No. 396-Fetal health surveillance: intrapartum consensus guideline. J Obstet Gynaecol Can. 2020;42(3):316-348.e9. doi:10.1016/j.jogc.2019.05.007
26. [Clinical practice guideline of normal birth]. Zhonghua Fu Chan Ke Za Zhi. 2020;55(6):371-375. doi:10.3760/cma.j.cn112141-20200428-00363
27. Murphy DJ, Strachan BK, Bahl R; Royal College of Obstetricians and Gynaecologists. Assisted vaginal birth: green-top guideline No. 26. BJOG. 2020;127(9):e70-e112. doi:10.1111/1471-0528.16092
28. Ministry of Public Health, State of Qatar. Antenatal, intrapartum and postnatal care in low risk pregnancy; 2020.
29. Queensland Clinical Guidelines. Intrapartum fetal surveillance. Queensland Health; 2026. Guideline No. MN25.15-V12-R30. Accessed October 28, 2026. https://www.health.qld.gov.au/__data/assets/pdf_file/0012/140043/g-ifs.pdf
30. Queensland Clinical Guidelines. Perineal care. Queensland Health; 2023. Guideline No. MN23.30-V5-R28. Accessed October 28, 2026. https://www.health.qld.gov.au/__data/assets/pdf_file/0022/142384/g-pericare.pdf
31. ACOG Committee opinion no. 766: approaches to limit intervention during labor and birth. Obstet Gynecol. 2019;133(2):e164-e173. doi:10.1097/AOG.0000000000003074
32. Management of breech presentation: green-top guideline no. 20b. BJOG. 2017;124(7):e151-e177. doi:10.1111/1471-0528.14465
33. Lee L, Dy J, Azzam H. Management of spontaneous labour at term in healthy women. J Obstet Gynaecol Can. 2016;38(9):843-865. doi:10.1016/j.jogc.2016.04.093
34. Intrapartum care for healthy women and babies. London: National Institute for Health and Care Excellence (NICE); December 14, 2022.
35. Mambourg F, Gailly J, Zhang WH. Guideline relative to low risk birth. Belgian Health Care Knowledge Centre (KCE); 2010. KCE Reports 139C. Accessed October 28, 2026. https://kce.fgov.be/sites/default/files/2021-11/kce_139c_guideline_low_risk_birth.pdf
36. World Health Organization. WHO recommendations for augmentation of labour; 2014. Accessed October 28, 2026. https://iris.who.int/server/api/core/bitstreams/cd4f3c19-fbea-487a-bf00-c7810008a7a5/content
37. Zang Y, Lu H, Zhang H, Huang J, Ren L, Li C. Effects of upright positions during the second stage of labour for women without epidural analgesia: a meta-analysis. J Adv Nurs. 2020;76(12):3293-3306. doi:10.1111/jan.14587
38. Mirzakhani K, Karimi FZ, Vatanchi AM, Zaidi FF, Najmabadi KM. The effect of maternal position on maternal, fetal and neonatal outcomes: a systematic review. J Midwifery Reprod Health. 2020;8(1):1988-2004. doi:10.22038/jmrh.2019.38133.1423
39. Healy M, Nyman V, Spence D, Otten RHJ, Verhoeven CJ. How do midwives facilitate women to give birth during physiological second stage of labour? A systematic review. PLoS One. 2020;15:e0226502. doi:10.1371/journal.pone.0226502
40. Dokmak F, Michalek IM, Boulvain M, Desseauve D. Squatting position in the second stage of labor: a systematic review and meta-analysis. Eur J Obstet

Gynecol Reprod Biol. 2020;254:147-152. doi:10.1016/j.ejogrb.2020.09.015
41. Berta M, Lindgren H, Christensson K, Mekonnen S, Adefris M. Effect of maternal birth positions on duration of second stage of labor: systematic review and meta-analysis. BMC Pregnancy and Childbirth. 2019;19(1):466. doi:10.1186/s12884-019-2620-0
42. Ying L, Wei Z, Qun H, Wenqin Y. [Influence of different delivering positions on perineal outcomes: a systematic review]. Chin Nurs Res. 2018;32.
43. Lei J, Jie Z, Li P, Yao S, Yafang L, Baoxin S. [Effects of 7 positions in the second stage of labour: a network meta-analysis]. J Nurs Sci. 2019;34(5).
44. Barrowclough JA, Lin L, Kool B, Hofmeyr GJ, Crowther CA. Maternal postures for fetal malposition in labour for improving the health of mothers and their infants. Cochrane Database Syst Rev. 2022;8(8):CD014615. doi:10.1002/14651858.CD014615
45. Rocha BDD, Zamberlan C, Pivetta HMF, Santos BZ, Antunes BS. Upright positions in childbirth and the prevention of perineal lacerations: a systematic review and meta-analysis [Posições verticalizadas no parto e a prevenção de lacerações perineais: revisão sistemática e metanálise]. Rev Esc Enferm USP. 2020;54:e03610. doi:10.1590/S1980-220X2018027503610
46. Zhu P, Liang X, Chen J, Zhen D, Tan Y. [Clinical application of vertical position combined with lateral position for promoting natural delivery]. Med Innov China. 2021;18:104-107.
47. Shedmake PV, Wakode SR. A hospital-based randomized controlled trial-comparing the outcome of normal delivery between squatting and lying down positions during labour. J Obstet Gynaecol India. 2021;71(4):393-398. doi:10.1007/s13224-021-01439-4
48. Feng H. [Application effect of different posture nursing for the full-term pregnancy and delivery of elderly parturient women with continuous occipito-transverse position and occipitoposterior position]. Nurs Pract Res. 2020;17(9):75-78.
49. Wang W, Lin X, Ke H, Liu X, Guo S. [Study on the effect of standing forward tilt and pelvic swing in the second stage of labor]. Chin Foreign Med Treat. 2020;39:167-170.
50. Zang Y, Lu H, Zhao L, Zhang H, Hu Y, Fu L. Barriers and facilitators to the implementation of a practice programme for upright positions in the second stage of labour in China: a qualitative study. Midwifery. 2022;114:103458. doi:10.1016/j.midw.2022.103458
51. Garbelli L, Lira V. Maternal positions during labor: midwives' knowledge and educational needs in northern Italy. Eur J Midwifery. 2021;5:15. doi:10.18332/ejm/136423
52. Baker K. Midwives should support women to mobilize during labour. Br J Midwifery. 2010;18(8):492-497. doi:10.12968/bjom.2010.18.8.49319
53. Sharma S, Jakhar R. Swiss ball exercise in active phase of labor: a review of clinical outcomes. IOSR J Dent Med Sci. 2024;23(12 Ser 1):52-59. doi:10.9790/0853-2312015259
54. Delgado A, Katz L, Melo RS, Amorim M, Lemos A. Effectiveness of the peanut ball use for women with epidural analgesia in labour: a systematic review and meta-analysis. J Obstet Gynaecol. 2022;42(5):726-733. doi:10.1080/01443615.2021.1997959
55. Watson K, Mills TA, Lavender T. Experiences and outcomes on the use of telemetry to monitor the fetal heart during labour: findings from a mixed methods study. Women Birth. 2022;35(3):e243-e252. doi:10.1016/j.wombi.2021.06.004
56. Rathina N, Srivastava S, Rawat S. Mobility as an effective non-pharmacological method for parturition: a pilot study. Nurs Midwifery Res J. 2024;20(1):31-38. doi:10.1177/0974150X231225839

CONFLICTS OF INTEREST

The authors have each completed and submitted an ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors declare that they have no competing interests, financial or otherwise, related to the current work. J. Zhang reports that since the initial planning of the work, he has received support for the present manuscript from the Project of Modern Hospital Management and Development Institute, Nanjing University/ Aid Project of Nanjing Drum Tower Hospital Health, Education and Research Foundation (NDYG010) and the Research Topic of Hospital Management Innovation of Jiangsu Hospital Association (JSYGY-3-2023-256), where he serves as Principal Investigator (PI). X. Fan reports that since the initial planning of the work he has received support for the present manuscript from the National Natural Science Foundation of China Project (72204123), where he serves as Principal Investigator (PI).

FUNDING

This work was supported by the National Natural Science Foundation of China Project (72204123) to X. Fan (PI). Project of Modern Hospital Management and Development Institute, Nanjing University/Aid project of Nanjing Drum Tower Hospital Health, Education & Research Foundation (NDYG010) to J. Zhang (PI). Research topic of hospital management innovation of Jiangsu Hospital Association (JSYGY-3-2023-256) to J. Zhang (PI).

ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval and informed consent were not required for this study.

DATA AVAILABILITY

The data supporting this research can be found in the Supplementary file.

AUTHORS' CONTRIBUTIONS

JZ: research concept and design, collection and assembly of data, data analysis and interpretation, writing of the manuscript. SC: collection and assembly of data, data analysis and interpretation, writing of the manuscript . XF: data analysis and interpretation, revision of the manuscript. JL: research concept and design, data analysis and interpretation. JH: collection of data. LL: research concept and design, revision of the manuscript. XH: research concept and design, writing and revision of the manuscript. All authors read and approved the final version of the manuscript.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.

SUPPLEMENTARY FILE DISCLAIMER

The content has been provided by the author(s) and has not been reviewed, verified, or endorsed by European Publishing. It may not have undergone peer review. The views, opinions, and recommendations expressed are solely those of the author(s) and do not necessarily reflect the position of European Publishing. European Publishing accepts no responsibility or liability for any consequences arising from the use of, or reliance on, this content.