How do midwives facilitate women to give birth during physiological second stage of labour? A systematic review


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how do midwives facilitate women to give birth during physiological second stage of labour? A systematic review

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Abstract

Both nationally and internationally, midwives’ practices during the second stage of labour vary. A midwife’s practice can be influenced by education and cultural practices but ultimately it should be informed by up-to-date scientific evidence. We conducted a systematic review of the literature to retrieve evidence that supports high quality intrapartum care during the second stage of labour. A systematic literature search was performed to September 2019 in collaboration with a medical information specialist. Bibliographic databases searched included: PubMed, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Maternity and Infant Care Database and The Cochrane Library, resulting in 6,382 references to be screened after duplicates were removed. Articles were then assessed for quality by two independent researchers and data extracted. 17 studies focusing on midwives’ practices during physiological second stage of labour were included. Two studies surveyed midwives regarding their practice and one study utilising focus groups explored how midwives facilitate women’s birthing positions, while another focus group study explored expert midwives’ views of their practice of preserving an intact perineum during physiological birth. The empirical findings were synthesised into four main themes namely: birthing positions, non-pharmacological pain relief, pushing techniques and optimising perineal outcomes; the results were outlined and discussed. By implementing this evidence midwives may enable women during the second stage of labour to optimise physiological processes to give birth. There is, however, a dearth of evidence relating to midwives’ practice, which provides a positive experience for women during the second stage of labour. Perhaps this is because not all midwives’ practices during the second stage of labour are researched and documented. This systematic review provides a valuable insight of the empirical evidence relating to midwifery practice during the physiological second stage of labour, which can also inform...
Introduction

Childbirth is a significant and memorable life event for a woman and her family. Women’s experiences of birth have both short and long-term effects on their health and wellbeing for both themselves and their infants [1–6]. As stated by the World Health Organization (WHO) in 2018, the primary outcome for all pregnant women is to have a ‘positive childbirth experience’. This includes giving birth to a healthy baby in a conducive, safe environment with continuity of care provided by kind, competent maternity care professionals [7]. In addition, the WHO has highlighted that most women value a physiological labour and birth. Experiencing physiological childbirth also has a long-term impact: ‘The health and well-being of a mother and child at birth largely determines the future health and wellness of the entire family’ [8]. Furthermore, childbirth has physical effects on women and their future pregnancies. Although cesarean delivery is associated with a reduced rate of urinary incontinence and pelvic organ prolapse, it is also associated with increased risks for fertility, future pregnancy, and long-term childhood outcomes such as increased odds of asthma and obesity [9].

Normal physiological birth was defined by the WHO as ‘spontaneous in onset, low-risk at the start of labour and remaining so throughout labour and delivery. The infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy. After birth mother and infant are in good condition’ [10]. Labour can be divided into three stages: the first, second and third stage of labour. The first stage of labour is defined as the time period characterised by regular painful uterine contractions until full dilatation of the cervix and the second stage of labour as the time period between full dilatation of the cervix and the birth of the baby, whilst the woman is experiencing an involuntary urge to bear down, due to expulsive uterine contractions [7]. The third stage is recognised as the period after the birth of the baby ending with the birth of the placenta and fetal membranes [11].

Normal physiological birth is associated with the non-use of an epidural or other pharmacological pain relief, as it may affect the natural course of labour and can lead to rare but potentially severe adverse maternal effects [10, 12]. The same accounts for induction and augmentation of labour. Especially high doses of synthetic oxytocin may cause more and longer painful contractions when compared to normal labour [13]. Uvnäs-Moberg has highlighted how the process of physiological labour and birth can be enabled by the interplay of reproductive hormonal and neuro-hormonal mechanisms when the midwife provides kind and respectful caring practices. These practices promote oxytocin release for effective uterine contractions during labour and the relaxation of the birth canal [14, 15]. Little is known of the variety of physical and emotional actions the midwife does when ‘being with’ a woman during birth of the baby, in particular, how midwives facilitate this physiological process. According to Kennedy et al. it is a research priority to identify and highlight aspects of care that optimise, and those that disturb, the biological/physiological processes during childbirth [16].

The objective of this systematic review was therefore, to examine the evidence relating to intrapartum midwifery care, focusing specifically on care during the second stage of labour.
The structured research questions were formulated using the PICO (Patient or Population, Intervention, Comparison, Outcome) framework for quantitative research and the PEO (Population, Exposure, Outcomes) question format for qualitative research questions: "How do midwives facilitate women to give birth during physiological second stage of labour?"

The results of this systematic review will support high quality intrapartum care during the second stage and inform midwifery practice, education and future research and positively influence this aspect of midwifery care for women.

Methods

We undertook a systematic literature search based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement [17]. The Peer Review of Electronic Search Strategies (PRESS) 2015 Guideline Statement was used to enhance the quality and comprehensiveness of the electronic literature search [18]. The PICO framework for quantitative and PEO framework for qualitative studies were also utilised: P: women in second stage of labour, I: intrapartum intervention by midwives, C: standard care, O: spontaneous physiological birth. PEO framework: P: women in second stage of labour, E: midwives’ practices in the second stage of labour, O: spontaneous physiological birth. Systematic searches of the bibliographic databases: EMBASE.com, Cinahl, PsycINFO, PubMed, Maternity and Infant Care Database and The Cochrane Library were conducted.

The search strategy included the Boolean terms OR and AND, the search terms included controlled terms (for example, MeSH terms in PubMed and Emtree in Embase) as well as free text terms and truncations (‘) [19] Table). We used free text terms only in The Cochrane Library and synonyms and variations of the keywords in all databases. The search terms include: “Labor, Obstetric”[Mesh] OR “Parturition”[Mesh] OR “Delivery, Obstetric” [Mesh] OR labor [tiab] OR labour[tiab] OR birth”[tiab] OR childbirth”[tiab] OR parturition”[tiab] OR deliver”[tiab] OR “Labor, Stage, Second”[Mesh], see Fig 1.

Inclusion/exclusion criteria

Only full text articles published in peer-reviewed journals were included. All languages were accepted, as the authors were part of the EU COST Action IS1405: Building Intrapartum Research Through Health (BIRTH) network and therefore had access for most languages to be translated, if necessary. All studies describing midwives’ care or practice during second stage of physiological birth or normal birth were included. Both relevant quantitative and qualitative studies were eligible for review.

Case studies were excluded. Studies examining midwifery practice of women that focused only on care during the first or third stage of labour were excluded. Studies including women who had an epidural, spinal, operative vaginal birth or caesarean section were also excluded. Furthermore, studies that included women, who had a preterm birth, had their pregnancy induced or labour augmented with intravenous oxytocin were excluded. Searches of the bibliographic databases were undertaken initially from inception to 8th May 2018. The search was further refined to include papers published from 1st January 2008 to 8th May 2018, reflecting the National Institute for Health and Care Excellence (NICE) [19] Intrapartum care guidance which was updated at the end of 2007. Furthermore, we updated the search to 5th September 2019, in collaboration with a medical librarian. Animal studies were excluded.

Studies were selected for inclusion following a two-stage process using Covidence, which is a web-based software platform that streamlines the production of systematic reviews, including Cochrane reviews. Within the first screening stage each study had the title and abstract screened by pairs of two independent reviewers (CV, DS, VN, MH) and studies were excluded
if both reviewers considered a study did not meet the eligibility criteria. Full text manuscripts of the selected studies were then retrieved. Two reviewers independently, made the final inclusion or exclusion decisions on examination of the full text manuscripts. Any disagreements were discussed and resolved by a lead review author (MH or CV). The reasons for study exclusion were reported in the PRISMA flow diagram, see Fig 2.

**Quality assessment**

Articles that passed the two-stage screening process then underwent quality assessment and their reference lists were hand searched. The tools utilised to assess the quality of evidence depended on each study’s methodological approach. To assess the risk of bias in randomised controlled trials the Cochrane Collaboration’s tool for assessing risk of bias was used [20] (Table 1). For all other study designs the Critical Appraisal Skills Programme (CASP) criteria was used (Critical Appraisal Skills Programme 2018) [21]. The Grading of Recommendations Assessment, Development and Evaluation (GRADE), the Cochrane’s recommended approach for grading the body of evidence, was also utilised for the quantitative studies. Confidence in the Evidence from Reviews of Qualitative research (CERQual) was used for grading the confidence in the evidence of qualitative studies.

**Results**

The systematic search resulted in 13,034 records initially imported into Mendeley (a reference manager) aiding detection of duplicates, leaving 7,108 imported for screening into Covidence.
Further duplicates were detected by Covidence, with 6,382 remaining for screening. Titles and abstracts were then reviewed; subsequently 523 articles were retrieved for full text assessment. Following detailed review 506 articles did not meet the inclusion criteria leaving 17 studies included in this systematic review. **Fig 2** summarises the search strategy and the reasons for exclusion. Studies were grouped according to the study subject and for each study a data extraction matrix was completed. The matrix comprised of ten key features of the study.
The seventeen included publications dated from 2008 to 2019. The majority of the studies were systematic reviews (n = 6, of which 3 were Cochrane reviews) [22–27], randomised controlled trials (n = 6) [28–33], one cohort studies with prospective data collection [34], two surveys [35, 36] and two qualitative focus group studies [37, 38].

The methodological quality of the 17 included studies was assessed. Table 1 shows the risk of bias in randomised controlled trials [28–33]. Most studies were of low or moderate quality, only the systematic reviews were of high quality [22–27]. The cohort study was assessed by CASP as good quality [34], both surveys were assessed as being of moderate quality [35, 36]. Quality assessment of the qualitative studies was assessed by Cerqual, resulting in a moderate level of confidence [37, 38].

Two studies emerged from the literature having surveyed midwives regarding their practice in the second stage of labour. One explored 1,496 midwives’ practices in France, throughout the second stage of labour [35], while the other focused on 607 midwives’ practices in England regarding ‘hands on or hands off’ the perineum at birth [36]. The Barasinski et al., [35] study highlighted that midwives’ practices were influenced by their years of experience and the designation of the maternity unit where they worked [35]. The units ranged from Level I to Level III (Level I = maternity ward without a neonatology department for women with straightforward pregnancy, Level III = maternity ward with a neonatology department and neonatal intensive care unit). The survey found that the practices reported by the midwives in France were not always consistent with the scientific literature and that they could not always ensure the physiological approach to birth; particularly the midwives working in the level III units. This was in comparison to midwives working in the level I units, where women were most often encouraged to adopt non-horizontal positions, could choose which method of pushing they preferred (valsalva or open glottis pushing) and significantly, an increased number of midwives in these units reported using warm compresses on the perineum during the second stage of labour. The survey of midwives in England [36] found that 299 (49.3%, 95% CI 45.2–53.3%) midwives preferred the “hands-off” method while 48.6% preferred “hands on”.

### Table 1. Risk of bias.

<table>
<thead>
<tr>
<th>Studies Name et al, Year</th>
<th>Random sequence allocation (selection bias)</th>
<th>Allocation concealment (selection bias)</th>
<th>Blinding of participants &amp; personnel (performance bias)</th>
<th>Blinding of outcome (detection bias)</th>
<th>Incomplete outcome data (attrition bias)</th>
<th>Selective reporting (reporting bias)</th>
<th>Other bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alihosseni et al. (2018)</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<tr>
<td>Fahami et al. (2011)</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Shahoei et al. (2017a)</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
<td>■</td>
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<tr>
<td>Shahoei et al. (2017b)</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
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<td>■</td>
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<tr>
<td>Valiani et al. (2016)</td>
<td>■</td>
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<td>■</td>
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<td>■</td>
</tr>
<tr>
<td>Vaziri et al. (2016)</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>

Red = High  
Yellow = Unclear  
Green = Low  

https://doi.org/10.1371/journal.pone.0226502.t001
Table 2. Data extraction matrix.

<table>
<thead>
<tr>
<th>Midwives’ practices</th>
<th>Author, year, Country, Aim of the study</th>
<th>Study design</th>
<th>Population Group and size (age, parity, ethnicity, etc.)</th>
<th>Quality of study (CASP, GRADE)</th>
<th>GRADE</th>
<th>Components associated with outcomes</th>
<th>Outcomes assessed on outcomes</th>
<th>Results</th>
<th>Key conclusions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth positions, pushing methods, perineal protection, personal support techniques</td>
<td>Baranicki et al., 2018</td>
<td>Cross-sectional internet survey</td>
<td>1096 midwives from 377 maternity units in hospital-based who attended at least 1 birth in 2013. Level 1 = maternity ward without a neonatology dept. (four units); Level 2 = maternity ward with a neonatology dept. Level 3 = maternity ward with a neonatology dept. and neonatal intensive care unit (380/2)</td>
<td>⬤ ⬤ ⬤ ⬤</td>
<td>Very Low</td>
<td>Varieties of birth positions, pushing methods, perineal protection, personal support techniques (perineal massage, lubricant, warm compresses, management of fetal head, Bignes manoeuvre, intubation, delivery of head). Midwives’ feelings about facilitating physiological birth.</td>
<td>One third of midwives let women choose the type of pushing. Half of the midwives (55.5%) didn’t use perineal massage. 28% of all midwives used warm compresses on the perineum with significantly more use (25.6%−P&lt;0.001) on intact vs. episiotomized. Most midwives (91.4%) preferred the hands-off technique. 81.3% of midwives thought that labor management (whether or not) was achieved physiologically. Overall, only 10.6% of midwives were comfortable with all the maternal position in birth.</td>
<td>Practice reported by French midwives are not always consistent with the scientific literature or with a physiological approach to birth. These practices vary based on experience and type of unit where they work. There is an absence of professional guidelines for midwives in France.</td>
<td></td>
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<tr>
<td></td>
<td>Begley et al., 2018</td>
<td>Qualitative focus group of midwives’ views on the skills that they employ in preserving the perineum intact</td>
<td>Four groups: Expert midwives (1 from New Zealand and Ireland); Intermediate midwives (1 from Ireland and 1 from New Zealand); Fair midwives (3 from Ireland and 1 from New Zealand). Mean length of time working as a midwife was 16.6 years (SD 10.1, range 2–36 years)</td>
<td>Moderate level of confidence</td>
<td>Expert was defined as achieving, in the preceding 5.5 years, an episiotomy rate for multipara women of less than 11.8% (the mean rate from all NE and Ireland); if data combined, a 'no sutures' rate (combination of first degree tears did not require sutures, and intact perineums of more than 40%) and a rate of less than 3.5% for serious perineal tears (or one-fifth of fourth degree tears). Four core themes were identified from the data on participants’ expertise in relation to techniques they used during birth to preserve the perineum. They were: ‘Calm, controlled birth’; ‘Position and technique in early second stage’; ‘Hands on/off’ and ‘Blow and breathe the baby out’. These techniques were endorsed by all midwives to achieve rates, in multi-parous women, of 0.9% for episiotomy, 0.8% for ‘no sutures’, and 0.9% for serious lacerations.</td>
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</tr>
<tr>
<td></td>
<td>Trochez et al., 2018</td>
<td>Qualitative focus group of midwives in the second stage of labour</td>
<td>1000 midwives survey continued hands on or off</td>
<td>Observational postal questionnaire</td>
<td>Response rate 60.7% (n = 609)</td>
<td>⬤ ⬤ ⬤</td>
<td>To estimate the number of midwives practicing either “hands on” or “hands off” in the second stage of labour.</td>
<td>299 (49.3%) Cфи = 0.22; 55.2% midwives preferred the “hands off” method; 40.4% preferred “hands on”. A low episiotomy rate in midwives who prefer the “hands off” method (17% vs. 44.1%, p&lt;0.001). A higher proportion of midwives in the “hands off” group would need an episiotomy (57.1% vs. 24.8%, p&lt;0.001) on induction other than first dilatation.</td>
<td>Midwives in the UK apply both methods of hands-on and hands-off during the second stage of labour.</td>
<td></td>
</tr>
</tbody>
</table>
| | De Jonge et al., 2008 | Qualitative focus group of midwives in women’s positions during second stage of labour | 6 focus groups with purpose sample of 31 independent participants, one midwife from rural, semi-urban and urban areas from different parts of the country of various ages and educational backgrounds | Moderate level of confidence | Topic guide: midwives’ experience with birthing positions, interfering to caregivers about positions, factors that influence use of positions and knowledge and skills are assisting births in various positions. | Informal consent/ decision factors related to giving informed consent Working conditions Obstetric factors | Men use blowing and breathing techniques (but not a specific one). A quarter stated all 10 factors (informed) in acute positions. Giving women informed decision making in sitting positions that are most appropriate. Midwives emphasized women should be aware that the process of birth is largely unpredictable. Equipment for men to assist the birth is more midway friendly. | Influence of midwives’ working conditions on use of birthing positions was important factor. | How midwives facilitate women to give birth during physiological second stage of labour? (Continued)
### Table 2. (Continued)

<table>
<thead>
<tr>
<th>Birthing positions</th>
<th>Women's Position in the second stage</th>
<th>Key conclusions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Jonge et al., 2010</td>
<td>Any upright position assumed by pregnant women during the second stage of labour compared with supine or lithotomy positions.</td>
<td>The upright position was associated with a reduced risk of second-stage labour: 0.75 (0.66-0.86) compared with supine position.</td>
<td>The use of squatting mothers was less in the squatting group compared to sitting and lithotomy positions (p &lt; 0.001).</td>
</tr>
<tr>
<td>Gupta et al., 2017</td>
<td>Any upright position assumed by pregnant women during the second stage of labour compared with supine or lithotomy positions.</td>
<td>The mean score of pain severity at the end of stage was significantly lower in the heat therapy group (p = 0.004).</td>
<td>Further studies can clarify the advantages and disadvantages of alluck.</td>
</tr>
<tr>
<td>Fahami et al., 2011</td>
<td>To investigate the effect of heat therapy on pain severity in primigravida women.</td>
<td>Pain severity measured by the McGill pain intensity scale.</td>
<td>Heat therapy reduces the labour pain.</td>
</tr>
<tr>
<td>Shahoei et al., 2017a</td>
<td>To investigate the effect of transcutaneous electric nerve stimulation (TENS) on pushing techniques in primigravida women.</td>
<td>Pain severity measured by the McGill pain intensity scale.</td>
<td>Further studies can clarify the advantage of TENS.</td>
</tr>
<tr>
<td>Pushing techniques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midwives’ practices</td>
<td>Author, year</td>
<td>Country</td>
<td>Study design</td>
</tr>
<tr>
<td>---------------------------</td>
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</tr>
<tr>
<td>Pushing/bearing down methods for the second stage of labour</td>
<td>Lemos et al., 2017</td>
<td>To evaluate the benefits and possible disadvantages of different kinds of techniques regarding maternal pushing/breathing during the expulsive stage of labour on maternal and fetal outcomes</td>
<td>Cochrane Review</td>
</tr>
<tr>
<td>Delayed pushing in lateral position</td>
<td>Vaziri et al., 2016</td>
<td>Iran</td>
<td>RCT (non-ITT analyses)</td>
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<tr>
<td></td>
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<tr>
<td>Optimising perineal outcomes</td>
<td></td>
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</tbody>
</table>
Table 2. (Continued)

| Perineal technique for reducing perineal trauma | Aasheim et al., 2017 | Cochrane review | 22 trials were eligible for inclusion (with 20 trials involving 15,181 women) | Perineal techniques during the second stage of labour | Hands-on or hands-off perineal massage was found to make a difference in incidence of intact perineum (RR 0.65, 95% CI 0.12 to 3.26, moderate-quality evidence), 1st degree tears (RR 1.19, 95% CI 0.55 to 2.56, moderate-quality evidence), or 2nd degree tears (RR 1.08, 95% CI 0.48 to 2.47, low-quality evidence), 3rd or 4th degree tears (RR 1.00, 95% CI 0.00 to 1.00, low-quality evidence) was unclear or inconsistent. |
| --- | --- | --- | --- | --- | |
| | | | | Moderate-quality evidence suggests that hands-off techniques may reduce episiotomy, but this technique has no impact on other outcomes. There was insufficient data to show whether other perineal techniques could improve outcomes. | |
| | | | | Hands-on hands-off. Substantial heterogeneity (m2 = 239.9) or fourth-degree tears more than others that should be interpreted with caution. | |
| | | | | Results: *Heterogeneity was high for first-degree tear, second-degree tear and episiotomy—data should be interpreted with caution.* | |
### Results Key conclusions Comments

#### Perineal heating pads

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study design</th>
<th>Population Group and size (n)</th>
<th>Quality of evidence</th>
<th>Aim of the study</th>
<th>Components associated with outcomes</th>
<th>Results</th>
<th>Key conclusions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aasheim et al., 2018</td>
<td>Single blind clinical trial</td>
<td>144 primiparous women recruited, randomly 54 intervention and 55 control in group</td>
<td>High</td>
<td>To determine the effect of perineal heating pads on the frequency of episiotomies and perineal tears in primiparous female</td>
<td>A heated pad was placed on the external region of the perineum. It was placed from 30 minutes at the start of the second stage of labor, by the trained midwife and removed from the perineum during the mother’s transfer to the labor room.</td>
<td>The results showed a significant difference between the two groups in terms of the episiotomy rate (41% v's 21%, p = 0.025). The intervention group had a significantly lower incidence of episiotomy, perineal trauma and third-degree tears in the control group. The incidence of episiotomy was significantly lower in the intervention group (RR 0.44, 95% CI 0.22–0.87).</td>
<td>The results of the current study revealed that the use of perineal heating pad during the second stage of labor can be effective in reducing the episiotomy rate (statistically significant) and intact perineum (though not statistically significant) in primiparous women.</td>
<td>The results of this study have to be interpreted cautiously because of the very low quality of the study.</td>
</tr>
<tr>
<td>Aquino, 2018</td>
<td>Nine RCTs reporting on 3,374 women</td>
<td>Perineal massage during the second stage of labour: a systematic review and meta-analysis of randomized controlled trials</td>
<td>High</td>
<td>To evaluate whether perineal massage techniques during vaginal delivery decreases the risk of perineal trauma.</td>
<td>Perineal massage during the second stage of labour reduces the frequency of episiotomy, first, and second-degree tear and intact perineum.</td>
<td>The results of the current study revealed that the use of perineal massage during the second stage of labour can reduce the need for episiotomy, and avoid perineal injuries, as well as significantly lower the incidence of episiotomy (RR 0.69, 95% CI 0.50–0.97) and intact perineum, which was significantly higher in the perineal massage group (RR 1.40, 95% CI 1.01–1.93) and the incidence of episiotomy which was significantly lower in the perineal massage group (RR 0.44, 95% CI 0.22–0.87).</td>
<td>Perineal massage during labour is associated with significant lower risk of severe perineal trauma, such as third and fourth-degree tears and episiotomy. Perineal massage was usually shown by a midwife in the second stage of labour during or between contractions and during pushing time, with the index or middle finger, using a water-soluble lubricant.</td>
<td></td>
</tr>
<tr>
<td>Aquino et al., 2018</td>
<td>Seven trials, including 2103 women</td>
<td>To evaluate whether perineal massage techniques during vaginal delivery reduces the risk of perineal trauma</td>
<td>High</td>
<td>To evaluate whether perineal massage techniques during vaginal delivery decreases the risk of perineal trauma.</td>
<td>Perineal massage during the second stage of labour reduces the frequency of episiotomy, first, and second-degree tear and intact perineum.</td>
<td>The results of the current study revealed that the use of perineal massage during the second stage of labour can reduce the need for episiotomy, and avoid perineal injuries, as well as significantly lower the incidence of episiotomy (RR 0.69, 95% CI 0.50–0.97) and intact perineum, which was significantly higher in the perineal massage group (RR 1.40, 95% CI 1.01–1.93) and the incidence of episiotomy which was significantly lower in the perineal massage group (RR 0.44, 95% CI 0.22–0.87).</td>
<td>Perineal massage during labour is associated with significant lower risk of severe perineal trauma, such as third and fourth-degree tears and episiotomy. Perineal massage was usually shown by a midwife in the second stage of labour during or between contractions and during pushing time, with the index or middle finger, using a water-soluble lubricant.</td>
<td></td>
</tr>
<tr>
<td>Maggio et al., 2019</td>
<td>Seven trials, including 2103 women</td>
<td>To evaluate the effectiveness of warm compress during the second stage of labour in reducing perineal trauma.</td>
<td>High</td>
<td>To evaluate the effectiveness of a warm compress during the second stage of labour in reducing perineal trauma during and in between pushes in second stage.</td>
<td>Warm compresses usually started when the baby’s head began to distend fetal descent in the second stage. Warm compresses during the second stage of labour results in less perineal trauma during and in between pushes in second stage. Warm compresses usually started when the baby’s head began to distend fetal descent in the second stage. Warm compresses during the second stage of labour results in less perineal trauma during and in between pushes in second stage.</td>
<td>The incidence of perineal trauma A higher rate of intact perineum in the intervention group compared to the control group (22.4% vs 15.4%; RR 1.46, 95% CI 1.23 to 1.74; a lower rate of third degree tears (1.9% vs 5.0%; RR 0.38, 95% CI 0.16 to 0.75); fourth degree tears (0.0% vs 6.0%; RR 0.01, 95% CI 0.00 to 0.14); third and fourth degree tears was combined (3.5% vs 5.8%; RR 0.58 95% CI 0.20 to 0.90) and of episiotomy (0.66% vs 1.3%; RR 0.44, 95% CI 0.13 to 0.90).</td>
<td>Perineal massage during labour is associated with significant lower risk of severe perineal trauma, such as third and fourth-degree tears and episiotomy. Perineal massage was usually shown by a midwife in the second stage of labour during or between contractions and during pushing time, with the index or middle finger, using a water-soluble lubricant.</td>
<td></td>
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<td>Pincus et al., 2019</td>
<td>Seven trials, including 2103 women</td>
<td>To evaluate whether perineal massage techniques during vaginal delivery reduces the risk of perineal trauma as a hand-off technique.</td>
<td>High</td>
<td>To evaluate whether a hand-off technique during vaginal delivery reduces the risk of perineal trauma during the second stage of labour. Hand-off technique during vaginal delivery results in less incidence of perineal trauma during the second stage of labour.</td>
<td>Hands-on technique versus hands-off during vaginal delivery Primary outcome: Severe perineal trauma.</td>
<td>All the secondary outcomes were not significant, except for the incidence of intact perineum, which was significantly higher in the perineal massage group (RR 1.40, 95% CI 1.01–1.93) and the incidence of episiotomy which was significantly lower in the perineal massage group (RR 0.44, 95% CI 0.22–0.87).</td>
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<td>Shubert et al., 2017b</td>
<td>N = 190 multiparous women</td>
<td>To determine the effect of perineal massage in the 2nd stage of labour on women’s perineum.</td>
<td>High</td>
<td>To determine the effect of perineal massage in the 2nd stage of labour on women’s perineum.</td>
<td>Rate of episiotomy and perineal laceration, secondary outcomes were comparison of pain perineum after 3 days, 10 days, and 3 months after childbirth.</td>
<td>The results revealed that the incidence of episiotomy was significantly lower in the intervention group (p = 0.03). The incidence of third-degree tears (0.9% vs 2.1%; RR = 0.41) and of episiotomy was significantly lower in the intervention group (p = 0.05). There were 3.1% of second-degree lacerations, 7.7% of first-degree lacerations, 7.8% of second-degree lacerations, and 11% of third-degree lacerations in the intervention group. Comparison of postpartum pain showed that the severity of pain 3 days and 3 months after childbirth was significantly lower in the intervention group (p = 0.05, respectively), the severity of pain on the 4th month did not differ significantly (p = 0.30).</td>
<td>Perineal massage during the second stage of labour can reduce the incidence of episiotomy, and avoid perineal injuries, and perineal pain.</td>
<td>How midwives facilitate women to give birth during physiological second stage of labour?</td>
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Less-experienced midwives were more likely to prefer the “hands off” (72% vs. 41.4%, p<0.001). A higher proportion of midwives in the “hands-off” group would never do an episiotomy (37.1% vs. 24.4%, p = 0.001) for indications other than fetal distress.

A further study explored the views of 31 midwives in the Netherlands, in relation to facilitating women’s birthing positions during the second stage of labour [38]. This qualitative study utilised six focus groups to collate the data, which were interpreted using Thachuk’s approach [39]. Thachuk’s work defines how women are involved in decision making in different maternity care models; for example, the medical model of informed consent in comparison to the midwifery model of informed choice. The influence of midwives’ working conditions on the use of birthing positions was an important factor in this study, in particular midwives who conformed to the medical philosophy of care. When asked, 8 (26%) midwives reported that all of the last 10 births they had facilitated was with the woman in the supine position, an additional 6 (19%) midwives stated 8 out of the last 10 were also supine. Midwives suggested that equipment for non-supine births should be more user-friendly. The birth positions midwives preferred were also influenced by their exposure during their initial education and experience during their career. This study acknowledged that giving women informed choice may assist them in using positions that are most appropriate [38].

Begley et al., conducted a focus group study in Ireland and New Zealand among 21 expert midwives to explore techniques used by expert midwives to preserve the perineum intact [37]. In this study a midwife was defined as an “expert” as her practice reflected an episiotomy rate of less than 11.8% (the mean rate from all New Zealand and Irish Midwife-led Unit data combined), rate of women in their care who have an intact perineum of more than 40%, their ‘no suture’ rate (combination of the number of women with first degree tears that did not require sutures), and a rate of less than 3.2% for serious perineal tears (or one third/fourth degree tear) in the previous 3.5 years of practice. Four core themes were identified: ‘Calm, controlled birth’, ‘Position and techniques in early second stage’, ‘Hands on or off?’ and ‘Slow, blow and breathe the baby out.’ Using the techniques described enabled these midwives to achieve rates, in nulliparous women, of 3.91% for episiotomy, 59.24% for ‘no sutures’, and 1.08% for serious lacerations.

**Themes**

The remainder of the included studies were primarily intervention studies highlighting evidence-based aspects of midwifery practice during the second stage of labour, with the potential of informing future practice. These empirical findings were synthesised into four main themes namely: birthing positions, non-pharmacological pain relief, pushing techniques and optimising perineal outcomes.

**Birthing positions.** The use of a squatting position is reported to decrease pain severity in the second stage of labour, thus positively affecting labour pain reduction for women. In addition, squatting is viewed as an easy, applicable method to reduce pain during the second stage of labour [32]. Primiparous women who adopt a sitting position are less likely to have an episiotomy and more likely to have a perineal tear [24, 34] with no clear difference however, reported in the number of 3rd or 4th degree perineal tears [24]. It is acknowledged that women should not be discouraged from adopting (semi-)sitting birthing positions to prevent perineal damage. Notably, longer duration of second stage was associated with more women experiencing episiotomies [34]. The upright position is, nonetheless, associated with a reduction in duration of second stage. If progress in labour is slower, then variation in position should be considered, particularly if the woman is in the supine position. Magnetic resonance (MR)
pelvimetry also showed that an upright birthing position significantly expands the female pelvic bony dimensions, suggesting facilitation of labour and birth [34].

**Non-pharmacological pain relief.** Two studies described methods of non-pharmacological pain relief adopted by midwives [29, 30]. A randomised sterilized control trial, using a heat pack (hot water bottle) during the second stage, with a sterilized wrap placed on the woman’s perineum for a minimum of five minutes. Pain was assessed using the McGill Pain linear scale during immediately following birth to assess the pain level during the second stage of labour. The mean score of pain severity relating to the second stage of labour showed a statistically significant difference between the two groups (p 0.000) and was lower in the heat therapy group than the routine care group [29]. The effect of transcutaneous electrical nerve stimulation (TENS) on the severity of pain during labour in primiparous women was examined [30]. The findings indicated the severity of pain during the second stage of labour was lower in the TENS group compared with the placebo and control groups (p = 0.000).

**Pushing techniques.** During normal physiological birth, when the cervix is fully dilated and/or the fetal head is on the pelvic floor, the mother will feel the urge to push and aided with expulsive contractions maternal pushing will lead to the birth of the baby. In the literature two different techniques of pushing are described: directed, coached, or Valsalva pushing with physiological or spontaneous pushing: Valsalva and physiological or spontaneous pushing. Directed pushing according to the Valsalva technique is repeated, prolonged breath holding and bearing down which causes the glottis to close and increases intrathoracic pressure. Predominantly resulting in closed glottis pushing for 3 to 4 times during each contraction. Physiological or spontaneous pushing is defined as full dilatation of the cervix and commencement of pushing only when women feel the urge to push. No specific instructions are given about timing and duration; mostly resulting in non-directed, multiple short pushes, with no sustained breath holding [25].

Studies comparing these two techniques have been primarily concerned with the effect of pushing style on neonatal acid-base status and/or the length of second stage. Some studies have directly addressed the relationship between the pushing method and perineal or pelvic floor injury or have included it in their analyses. The Cochrane review by Lemos et al., [25] found a mean reduction in the duration of second stage of labour by ten minutes and less third or fourth degree perineal tears, however, these results were not statistically significant and no conclusive (Table 1). A study by Vaziri et al., [33] compared spontaneous pushing with the urge to push (delayed pushing) in lateral position with immediate pushing (from the beginning of full dilation) using Valsalva in supine position. This study concluded that spontaneous pushing in the lateral position reduced duration of pushing, fatigue and pain severity, without affecting neonatal outcomes [33]. While the Cochrane review authors [25] highlighted their inability to report which technique of pushing is best for the mother or baby, the spontaneous pushing technique was found by Vaziri et al., [33] to be a safe method without causing any harm to the baby.

**Optimising perineal outcomes.** There are two main maternity care options to guide the birth of the fetal head, the hands-on or the hands-off (ordinarily with hands-poised) method. The hands-on method aims to prevent severe perineal tears by supporting the perineum during fetal crowning. The other hand is placed on the fetal head and the mother is asked to withhold from pushing, aiming to control the speed of the birth of the head. Lateral flexion of the fetal head is applied to facilitate delivery of the shoulders. With the hands-off (or hands-poised) method the hands do not touch the perineum or fetal head, allowing spontaneous delivery of the head and the shoulders; and the woman is guided in controlled pushing.

A Cochrane review by Aasheim et al. [22] found that hands-on or hands-off the perineum showed no clear supporting evidence in the incidence of intact perineum, first degree perineal
tears, second degree tears or third- or fourth-degree tears. However, episiotomy was performed more frequently in the hands-on group. A recent systematic review by Pierce-Williams et al., showed almost similar results. Hands-on technique during spontaneous vaginal delivery of singleton gestations resulted in similar incidence of several perineal traumas compared to a hands-off technique. However, the incidence of third-degree lacerations and of episiotomy increases with the hands-on technique [27].

According to the Cochrane review by Aasheim et al. supporting the perineum with a warm cloth or compress did not have a clear effect on the incidence of intact perineum, perineal trauma requiring suturing, first degree tears, second degree tears or episiotomy. However, fewer third or fourth-degree tears were reported in the warm-compress group [22]. A recent systematic review of Magoga et al., however, showed that warm compresses applied during the second stage of labour increases the incidence of intact perineum and lower the risk of episiotomy and severe perineal trauma. This systematic review included seven trials reporting on 2,103 women. This study showed that the use of a perineal heating pad during the second stage of labour can be effective in decreasing the episiotomy rate in primiparous women [26]. These results are consistent with the study of Alihosseni et al. [28].

Perineal massage during labour is usually done in the second stage, during or between contractions and during pushing time, with the index and middle fingers, using a water-soluble lubricant. The purpose of this technique is to gently stretch the perineum from side to side. Perineal massage increased the incidence of intact perineum and decreased the incidence of third- or fourth-degree tears. Perineal massage had no clear effect on first or second degree suturing, however, it may reduce episiotomy [22]. A further study examined the effectiveness of perineal massage [31] showing that in primiparous women a perineal massage of 30 minutes during the second stage of labour reduced the episiotomy rate (69% in the massage group, and 92% in the control group). According to a recent systematic review and meta-analysis of nine randomised controlled trials reporting on 3374 women, perineal massage during second stage of labour is associated with significant lower risk of severe perineal trauma, such as third- and fourth-degree lacerations and episiotomies [23].

Additional findings relating to other midwifery practices during the second stage of labour were also reported within the Cochrane review [33], including: whether the posterior or the anterior shoulder should be born first, the use of different oils/wax or cold compress on the perineum and the use of a perineal protection device. For the majority it is not clear if these techniques had a beneficial effect on preventing perineal trauma, with the exception of an increased incidence of intact perineum with the use of a perineal protection device.

Discussion
This systematic review focused specifically on midwives’ practices during the second stage of labour for women experiencing a physiological labour and birth. The results provide insight in how midwives practices are influenced by their years of experience, the designation of the maternity unit where they work, (for example, a midwife-led unit or an obstetric unit) and that midwives practices are not always consistent with the scientific literature or with a physiological approach to birth.

In relation to birthing positions, women can adopt various positions to give birth, largely, upright (such as, standing, squatting, kneeling) and supine (such as lateral, lithotomy, dorsal, semi-recumbent). The limited number of studies relating to birth position included in this review reported on perineal damage and pain severity and included midwives’ perspectives/practices. Ultimately, women should be facilitated to adopt the position they deem most
comfortable to give birth and should be educated with regards to all childbirth positions, encouraging them to select each of the positions voluntarily. The empirical evidence also supports the use of heat therapy in the form of a heat pack for women in the physiological second stage of labour, as it can effectively reduce labour pain [29]. No included studies discussed the effects of water on reducing pain during birth.

Regarding pushing techniques, we found no significant difference in the duration of the second stage of labour between spontaneous and directed pushing. While a Cochrane review highlighted an inability to report which technique of pushing is best for the mother or baby, woman’s preference, comfort and clinical context should therefore guide decisions [25].

As highlighted above a Cochrane review [22] and a systematic review by Pierce-Williams et al. [27] found that hands-on or hands-off the perineum showed no clear supporting evidence in the incidence of intact perineum, first degree perineal tears, second degree tears or fourth degree tears, with episiotomy being performed more frequently in the hands-on group. These reviews were inconsistent regarding third degree tears. The lack of heterogeneity of studies within the Cochrane review for third or fourth-degree tears means these data should be interpreted with caution. In conclusion, there is insufficient evidence to promote one of these midwifery practices over the other in regard to preventing perineal tears [22].

High-quality evidence suggests that compresses emerged in warm tap water increase the incidence of intact perineum and lower the risk of episiotomy and third and fourth-degree tears [26]. This low-cost highly effective intervention could easily be implemented in all birth settings. To optimise perineal outcomes during the second stage of labour, perineal massage can reduce the need for episiotomy, avoid perineal injuries and perineal pain [22].

Strengths and limitations

This is a full systematic review with searches across multiple databases reporting on published research on how midwives can facilitate women to give birth during the physiological second stage of labour. The methods of our review are transparent with full protocol published in PROSPERO in advance of the review [40].

In view of the variable risk of bias of the included trials, further trials using well-designed protocols are needed to ascertain the true benefits and risks of various midwifery practices during the second stage of labour.

When studying research about how to facilitate women to give birth during physiological second stage of labour, we came upon scarce evidence regarding the care and support provided by midwives. These non-clinical aspects of labour and birth matter to woman, and are essential components of quality intrapartum care for women and their family [WHO Intrapartum care 2018]. Only one article was included in our systematic review regarding this [37]. Begley et al. underlined in her qualitative study the importance of developing an empowering, trusting relationship with the woman, ensuring a quiet, calm environment, reassuring and supporting the woman to optimise her birth outcome. There is a dearth of evidence relating to non-clinical aspects of midwives’ practice during the second stage of labour, such as continuous support, emotional support, companionship, effective communication and respectful care. These aspects of care are often not regarded as priorities [7]. Perhaps this is because not all midwives’ practices are documented and therefore researched. More research is needed on how midwives practices may affect a woman’s experience of labour and birth outcomes.

For this review the second stage of labour was defined as the time period between full dilatation of the cervix and the birth of the baby, whilst the woman is experiencing an involuntary
urge to bear down, due to expulsive uterine contractions [7]. However, another definition of
the second stage of labour has been noted. Bjelke et al. outlines a definition of the second stage
of labour, which included two phases, the passive and the active phase [41]. The passive phase
is defined as full dilatation of the cervix before or in the absence of involuntary expulsive con-
tractions. During this phase the presenting part descends passively down in the maternal pel-
vis, eventually generating a reflex that causes a strong urge to push. The active phase is the
stage of expulsive efforts. This division of the second stage of labour, into two phases is rarely
reported. Further research could focus on how to manage the passive phase of the second stage
of labour.

Culture, birth settings and work practices effect the possibility of the physiological approach
to birth being enabled or not [35]. It is essential therefore that women with a straightforward
pregnancy* [42] can take an informed choice [43] and gain access to midwife-led services to
plan their birth at home or within a midwife-led unit, where the physiological approach to
birth is enabled. Gaining access to a midwife-led unit can be enabled by utilising an evi-
denced-based guideline for admission to either an alongside or freestanding midwife-led unit
and midwives can facilitate care by following a normal labour and birth care pathway [42, 44].

Conclusion
This review systematically collated pertinent literature by retrieving 6,382 studies after the
removal of duplicates. Following synthesis empirical evidence of different aspects of midwifery
practices relating to care during the second stage of labour were retrieved including: Birthing
positions, non-pharmacological pain relief, pushing techniques and optimising perineal out-
comes. By implementing this evidence midwives may enable women during the second stage
of labour to optimise physiological processes to give birth. There is however, a dearth of evi-
dence relating to midwives’ practice during the second stage of labour and further robust stud-
ies are required. There is also limited knowledge of how midwives’ practices may affect a
woman’s experience of the second stage of labour. Nevertheless, this systematic review pro-
vides a summary of the current empirical evidence of midwives’ practices of physiological sec-
ond stage of labour and can inform midwifery practice, education and future research in the
support of high-quality intrapartum care.

*Straightforward singleton pregnancy, is one in which the woman does not have any pre-
existing condition impacting on her pregnancy, a recurrent complication of pregnancy or a
complication in this pregnancy which would require on-going consultant input, has reached
37 weeks’ gestation and \( \leq \) Term +14 days [42].

Supporting information
S1 Checklist. PRISMA 2009 checklist.
(DOC)
S1 Table. Search strategy tables.
(DOCX)

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