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Routine vaginal examinations compared to other methods for assessing progress of labour to improve outcomes for women and babies at term (Review)

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TABLE OF CONTENTS

[Intervention Review]

Routine vaginal examinations compared to other methods for assessing progress of labour to improve outcomes for women and babies at term

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ABSTRACT

Background

Routine vaginal examinations are undertaken at regular time intervals during labour to assess whether labour is progressing as expected. Unusually slow progress can be due to underlying problems, described as labour dystocia, or can be a normal variation of progress. Evidence suggests that if mother and baby are well, length of labour alone should not be used to decide whether labour is progressing normally. Other methods to assess labour progress include intrapartum ultrasound and monitoring external physical and behavioural cues. Vaginal examinations can be distressing for women, and overdiagnosis of dystocia can result in iatrogenic morbidity due to unnecessary intervention. It is important to establish whether routine vaginal examinations are effective, both as an accurate measure of physiological labour progress and to distinguish true labour dystocia, or whether other methods for assessing labour progress are more effective. This Cochrane Review is an update of a review first published in 2013.

Objectives

To compare the effectiveness, acceptability, and consequences of routine vaginal examinations compared with other methods, or different timings, to assess labour progress at term.

Search methods

For this update, we searched Cochrane Pregnancy and Childbirth Trials Register (which includes trials from CENTRAL, MEDLINE, Embase, CINAHL, and conference proceedings) and ClinicalTrials.gov (28 February 2021). We also searched the reference lists of retrieved studies.

Selection criteria

We included randomised controlled trials (RCTs) of vaginal examinations compared with other methods of assessing labour progress and studies assessing different timings of vaginal examinations. Quasi-RCTs and cluster-RCTs were eligible for inclusion. We excluded cross-over trials and conference abstracts.

Data collection and analysis

Two review authors independently assessed all studies identified by the search for inclusion in the review. Four review authors independently extracted data. Two review authors assessed risk of bias and certainty of the evidence using GRADE.

Main results

We included four studies that randomised a total of 755 women, with data analysed for 744 women and their babies. Interventions used to assess labour progress were routine vaginal examinations, routine ultrasound assessments, routine rectal examinations, routine vaginal examinations at different frequencies, and vaginal examinations as indicated. We were unable to conduct meta-analysis as there was only one study for each comparison.

All studies were at high risk of performance bias due to difficulties with blinding. We assessed two studies as high risk of bias and two as low or unclear risk of bias for other domains. The overall certainty of the evidence assessed using GRADE was low or very low.

Routine vaginal examinations versus routine ultrasound to assess labour progress (one study, 83 women and babies)

Study in Turkey involving multiparous women with spontaneous onset of labour.

Routine vaginal examinations may result in a slight increase in pain compared to routine ultrasound (mean difference −1.29, 95% confidence interval (CI) −2.10 to −0.48; one study, 83 women, low certainty evidence) (pain measured using a visual analogue scale (VAS) in reverse: zero indicating 'worst pain', 10 indicating no pain).

The study did not assess our other primary outcomes: positive birth experience; augmentation of labour; spontaneous vaginal birth; chorioamnionitis; neonatal infection; admission to neonatal intensive care unit (NICU).

Routine vaginal examinations versus routine rectal examinations to assess labour progress (one study, 307 women and babies)

Study in Ireland involving women in labour at term. We assessed the certainty of the evidence as very low.

Compared with routine rectal examinations, routine vaginal examinations may have little or no effect on: augmentation of labour (risk ratio (RR) 1.03, 95% CI 0.63 to 1.68; one study, 307 women); and spontaneous vaginal birth (RR 0.98, 95% CI 0.90 to 1.06; one study, 307 women).

We found insufficient data to fully assess: neonatal infections (RR 0.33, 95% CI 0.01 to 8.07; one study, 307 babies); and admission to NICU (RR 1.32, 95% CI 0.47 to 3.73; one study, 307 babies).

The study did not assess our other primary outcomes: positive birth experience; chorioamnionitis; maternal pain.

Routine four-hourly vaginal examinations versus routine two-hourly examinations (one study, 150 women and babies)

UK study involving primiparous women in labour at term. We assessed the certainty of the evidence as very low.

Compared with routine two-hourly vaginal examinations, routine four-hourly vaginal examinations may have little or no effect, with data compatible with both benefit and harm, on: augmentation of labour (RR 0.97, 95% CI 0.60 to 1.57; one study, 109 women); and spontaneous vaginal birth (RR 1.02, 95% CI 0.83 to 1.26; one study, 150 women).

The study did not assess our other primary outcomes: positive birth experience; chorioamnionitis; neonatal infection; admission to NICU; maternal pain.

Routine vaginal examinations versus vaginal examinations as indicated (one study, 204 women and babies)

Study in Malaysia involving primiparous women being induced at term. We assessed the certainty of the evidence as low.

Compared with vaginal examinations as indicated, routine four-hourly vaginal examinations may result in more women having their labour augmented (RR 2.55, 95% CI 1.03 to 6.31; one study, 204 women).

There may be little or no effect on:

- spontaneous vaginal birth (RR 1.08, 95% CI 0.73 to 1.59; one study, 204 women);
- chorioamnionitis (RR 3.06, 95% CI 0.13 to 74.21; one study, 204 women);
- neonatal infection (RR 4.08, 95% CI 0.46 to 35.87; one study, 204 babies);
- admission to NICU (RR 2.04, 95% CI 0.63 to 6.56; one study, 204 babies).

The study did not assess our other primary outcomes of positive birth experience or maternal pain.

Authors' conclusions

Based on these findings, we cannot be certain which method is most effective or acceptable for assessing labour progress. Further large-scale RCT trials are required. These should include essential clinical and experiential outcomes. This may be facilitated through the

development of a tool to measure positive birth experiences. Data from qualitative studies are also needed to fully assess whether methods to evaluate labour progress meet women's needs for a safe and positive labour and birth, and if not, to develop an approach that does.

PLAIN LANGUAGE SUMMARY

Routine vaginal examinations in labour

What is the issue?

The aim of this Cochrane Review was to find out if routine vaginal examinations for assessing labour progress are effective and acceptable to women, and to compare the use of these examinations to other methods of assessing labour progress.

Why is this important?

Labour is usually monitored to ensure that it is progressing as expected, and that there are no signs of abnormal progress that might be harmful to mother or baby. The method most commonly used is routine vaginal examination (undertaken at regular time intervals), which provides information on how dilated the woman's cervix is and the position of the baby. Very slow labours can be a sign of underlying problems that may require interventions to speed up labour and birth (augmentation). However, slow labours can also be a normal variation of labour progress, and recent evidence suggests that if mother and baby are well, length of labour or cervical dilation alone should not be used to decide whether labour is progressing normally.

Other methods to assess labour progress include the use of ultrasound, assessing how the mother behaves, and external physical signs of progress, such as a purple line that develops between the mother's buttocks as labour progresses. However, these methods are not standard practice. The most effective method to assess labour progress has not been established.

Vaginal examinations can be uncomfortable, painful, and distressing. If slow but normal labours are misdiagnosed as being abnormal, this can lead to unnecessary interventions, such as augmentation or caesarean section. Some women may not want these interventions, and their use can cause emotional and physical harm. Misdiagnosis of labour progress either way can be physically and emotionally devastating. Women's views and experiences of the methods used to assess labour progress should be considered, alongside evidence of effectiveness.

What evidence did we find?

We searched in February 2021 and included four studies, with data for 744 women and babies. Overall, the evidence was uncertain or very uncertain due to the study methods and the inclusion of small numbers of women and babies.

Routine vaginal examinations versus routine ultrasound (one study, 83 women and babies)

Study in Turkey involving women with spontaneous onset of labour and who had given birth before: routine vaginal examinations may result in a slight increase in pain compared to routine ultrasound to assess labour progress.

The study did not assess our other primary outcomes: positive birth experience; augmentation of labour; spontaneous vaginal birth; chorioamnionitis (inflammation or infection of the membranes around the baby); neonatal infection; admission to neonatal intensive care unit (NICU).

Routine vaginal examinations versus routine rectal examinations (one study, 307 women and babies)

Study in Ireland involving women in labour at term. Compared with routine rectal examinations, routine vaginal examinations may have little or no effect on: augmentation of labour; spontaneous vaginal birth; neonatal infections; admission to NICU.

The study did not assess our other primary outcomes: positive birth experience; chorioamnionitis; maternal pain.

Routine four-hourly vaginal examinations versus routine two-hourly examinations (one study, 150 women and babies)

UK study involving women having their first baby in labour at term. Compared with routine two-hourly vaginal examinations, routine four-hourly vaginal examinations may have little or no effect on augmentation of labour or spontaneous vaginal birth - the results were compatible with both a benefit and harm.

The study did not assess our other primary outcomes: positive birth experience; chorioamnionitis; neonatal infection; admission to NICU; maternal pain.

Routine vaginal examinations versus vaginal examinations as indicated (one study, 204 women and babies)

Study in Malaysia involving women having their first baby and being induced at term. Compared with vaginal examinations as indicated, routine four-hourly vaginal examinations may result in more women having their labour augmented. There may be little or no effect on spontaneous vaginal birth, chorioamnionitis, neonatal infection, or admission to NICU.

The study did not assess our other primary outcomes of positive birth experience or maternal pain.

What does this mean?

We cannot be certain which method for assessing labour progress is most effective or acceptable to women. Further evidence is needed to identify the best way to assess labour progress and how this may affect women's birth experiences.

Summary of findings 1. Routine vaginal examination compared to routine ultrasound for assessing progress of labour to improve outcomes for women and babies at term

Routine vaginal examination compared to routine ultrasound for assessing progress of labour to improve outcomes for women and babies at term

Population: pregnant women, multiparous, in labour at term
Setting: tertiary care facility in an upper-middle-income country (Turkey)
Intervention: routine vaginal examination
Comparison: routine ultrasound examination

Outcomes	Relative effect (95% CI)	Anticipated absolute effects* (95% CI)			Certainty of the evidence (GRADE)	What happens
		With routine ultrasound examination	With routine vaginal examination	Difference		
Positive birth experience (primary outcome) № of participants: (0 studies)	-	-	-	See comment	-	The one study in this comparison did not report on women's positive experiences.
Augmentation of labour (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not report on augmentation of labour.
		See comment	See comment	See comment		
Spontaneous vaginal birth (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not report on spontaneous vaginal birth.
		See comment	See comment	See comment		
Chorioamnionitis (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not report on chorioamnionitis.
		See comment	See comment	See comment		
Neonatal infection (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not report on neonatal infection.
		See comment	See comment	See comment		
Admission to NICU (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not report on admission to NICU.
		See comment	See comment	See comment		

Maternal pain (primary outcome) № of participants: 83 (1 RCT)	-	The mean maternal pain (primary outcome) without routine vaginal examination was 0.	-	MD 1.29 lower (2.10 lower to 0.48 lower)	⊕⊕⊖⊖ LOW [1]	Pain measured using VAS, with 0 indicating the worst pain and 10 indicating no pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; **MD:** mean difference; **NICU:** neonatal intensive care unit; **RCT:** randomised controlled trial; **VAS:** visual analogue scale

GRADE Working Group grades of evidence
High certainty: We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded (−2) for very serious concerns around imprecision (wide CI, only one small study with 83 women).

Summary of findings 2. Routine vaginal examination compared to routine rectal examination for assessing progress of labour to improve outcomes for women and babies at term

Routine vaginal examination compared to routine rectal examination for assessing progress of labour to improve outcomes for women and babies at term

Patient or population: pregnant women in labour at term
Setting: maternity hospital in a high-income country (Ireland)
Intervention: routine vaginal examination
Comparison: routine rectal examination

Outcomes	Relative effect (95% CI)	Anticipated absolute effects* (95% CI)			Certainty of the evidence (GRADE)	What happens
		With routine rectal examination	With routine vaginal examination	Difference		
Women's positive experiences № of participants: (0 studies)	-	Study population			-	The one study in this comparison did not report on women's positive experiences.
		-	-	See comment		

Augmentation of labour (primary outcome) № of participants: 307 (1 RCT)	RR 1.03 (0.63 to 1.68)	Study population			⊕⊖⊖⊖ VERY LOW [1,2]	
		17.0%	17.5% (10.7 to 28.5)	0.5% more (6.3 fewer to 11.6 more)		
Spontaneous vaginal birth (primary outcome) № of participants: 307 (1 RCT)	RR 0.98 (0.90 to 1.06)	Study population			⊕⊖⊖⊖ VERY LOW [1,3]	
		89.5%	87.8% (80.6 to 94.9)	1.8% fewer (9 fewer to 5.4 more)		
Chorioamnionitis (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not report on chorioamnionitis.
		See comment	See comment	See comment		
Neonatal infection (primary outcome) № of participants: 307 (1 RCT)	RR 0.33 (0.01 to 8.07)	Study population			⊕⊖⊖⊖ VERY LOW [1,4]	
		0.7%	0.2% (0 to 5.3)	0.4% fewer (0.6 fewer to 4.6 more)		
Admission to neonatal intensive care unit № of participants: 307 (1 RCT)	RR 1.32 (0.47 to 3.73)	Study population			⊕⊖⊖⊖ VERY LOW [1,5]	
		3.9%	5.2% (1.8 to 14.6)	1.3% more (2.1 fewer to 10.7 more)		
Maternal pain (primary outcome) № of participants: (0 RCTs)	-	The mean maternal pain (primary outcome) without routine vaginal examination was 0.	-	See comment	-	The one study in this comparison did not report on maternal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

__CI:__ confidence interval; __RCT:__ randomised controlled trial; __RR:__ risk ratio

GRADE Working Group grades of evidence
High certainty: We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.

Very low certainty: We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded (−2) for very serious concerns around study design (risk of bias).
[2]Downgraded (−2) for very serious concerns around imprecision (wide CI crossing the line of no effect). Only 1 small study involving 307 women with only 53 events.
[3]Downgraded (−1) for serious concerns around imprecision. Only 1 small study with 307 women with 272 events.
[4]Downgraded (−2) for very serious concerns around imprecision. Only 1 small study of 307 babies with just 1 event.
[5]Downgraded (−2) for very serious concerns around imprecision. Only 1 small study involving 307 babies and 14 events.

Summary of findings 3. Routine 4-hourly vaginal examinations compared to routine 2-hourly vaginal examinations for assessing progress of labour to improve outcomes for women and babies at term

Routine 4-hourly vaginal examinations compared to routine 2-hourly vaginal examinations for assessing progress of labour to improve outcomes for women and babies at term

Population: primiparous pregnant women in labour at term
Setting: maternity hospital in a high-income country (UK)
Intervention: routine vaginal examinations 4-hourly
Comparison: routine vaginal examinations 2-hourly

Outcomes	Relative effect (95% CI)	Anticipated absolute effects* (95% CI)			Certainty of the evidence (GRADE)	What happens
		With routine vaginal examinations 2-hourly	With routine vaginal examinations 4-hourly	Difference		
Positive birth experience (primary outcome) № of participants: (0 studies)	-	-	-	See comment	-	The one study in this comparison did not assess women's positive birth experience.
Augmentation of labour (primary outcome) № of participants: 109 (1 RCT)	RR 0.97 (0.60 to 1.57)	Study population			⊕⊖⊖⊖ VERY LOW [1,2]	
		38.2%	37.0% (22.9 to 59.9)	1.1% fewer (15.3 fewer to 21.8 more)		
Spontaneous vaginal birth (primary outcome) № of participants: 150 (1 RCT)	RR 1.02 (0.83 to 1.26)	Study population			⊕⊖⊖⊖ VERY LOW [1,3]	
		69.3%	70.7% (57.5 to 87.4)	1.4% more (11.8 fewer to 18 more)		

Chorioamnionitis (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not assess chorioamnionitis.
		See comment	See comment	See comment		
Neonatal infection (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not assess neonatal infection.
		See comment	See comment	See comment		
Admission to NICU (primary outcome) № of participants: (0 studies)	See comment	Study population			-	The one study in this comparison did not assess admission to NICU.
		See comment	See comment	See comment		
Maternal pain (primary outcome) № of participants: (0 studies)	-	-	-	See comment	-	The one study in this comparison did not assess maternal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; **NICU:** neonatal intensive care unit; **RCT:** randomised controlled trial; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded (−2) for very serious concerns around study design (risk of bias).
[2]Downgraded (−2) for very serious concerns around imprecision. Only 1 small study involving 150 women and 41 events.
[3]Downgraded (−1) for serious concerns around imprecision. Only 1 small study with 150 women and 105 events.

Summary of findings 4. Routine vaginal examinations compared to vaginal examinations as indicated for assessing progress of labour to improve outcomes for women and babies at term

Routine vaginal examinations compared to vaginal examinations as indicated for assessing progress of labour to improve outcomes for women and babies at term

Population: primiparous pregnant women in labour at term
Setting: university medical centre in an upper-middle-income country (Malaysia)
Intervention: routine vaginal examinations
Comparison: vaginal examinations as indicated

Outcomes	Relative effect (95% CI)	Anticipated absolute effects* (95% CI)			Certainty of the evidence (GRADE)	What happens
		With vaginal examinations as indicated	With routine vaginal examinations	Difference		
Positive birth experience (primary outcome) № of participants: (0 studies)	-	-	-	See comment	-	The one study in this comparison did not assess women's positive birth experience.
Augmentation of labour (primary outcome) № of participants: 204 (1 RCT)	RR 2.55 (1.03 to 6.31)	Study population			⊕⊕⊖⊖ LOW [1]	
		5.8%	14.9% (6 to 36.8)	9.0% more (0.2 more to 30.9 more)		
Spontaneous vaginal birth (primary outcome) № of participants: 204 (1 RCT)	RR 1.08 (0.73 to 1.59)	Study population			⊕⊕⊖⊖ LOW [2]	
		32.0%	34.6% (23.4 to 50.9)	2.6% more (8.7 fewer to 18.9 more)		
Chorioamnionitis (primary outcome) № of participants: 204 (1 RCT)	RR 3.06 (0.13 to 74.21)	Study population			⊕⊕⊖⊖ LOW [3]	
		0.0%	0.0% (0 to 0)	0.0% fewer (0 fewer to 0 fewer)		
Neonatal infection (primary outcome) № of participants: 204 (1 RCT)	RR 4.08 (0.46 to 35.87)	Study population			⊕⊕⊖⊖ LOW [4]	
		1.0%	4.0% (0.4 to 34.8)	3.0% more (0.5 fewer to 33.9 more)		
Admission to NICU (primary outcome) № of participants: 204 (1 RCT)	RR 2.04 (0.63 to 6.56)	Study population			⊕⊕⊖⊖ LOW [5]	
		3.9%	7.9% (2.4 to 25.5)	4.0% more (1.4 fewer to 21.6 more)		
Maternal pain (primary outcome) № of participants: (0 studies)	-	-	-	See comment	-	The one study in this compar-

					ison did not assess maternal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; **NICU:** neonatal intensive care unit; **RCT:** randomised controlled trial; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded (−2) for very serious imprecision (wide CI). Only 1 small study of 204 women with 21 events.
[2]Downgraded (−2) for very serious imprecision (wide CI crossing the line of no effect). Only 1 small study with 68 events.
[3]Downgraded (−2) for very serious imprecision (wide CI crossing the line of no effect). Only 1 small study with 204 women and 1 event.
[4]Downgraded (−2) for very serious imprecision (wide CI crossing the line of no effect). Only 1 small study with 204 babies and 5 events.
[5]Downgraded (−2) for very serious imprecision (wide CI crossing the line of no effect). Only 1 small study of 204 babies with 12 events.

BACKGROUND

Monitoring labour progress is a central and routine component of intrapartum care for most women giving birth. The main rationale for monitoring progress is that this provides reassurance that labour is progressing as expected, and that it identifies deviation from normal labour progress early enough to intervene to prevent maternal or fetal morbidity. For most women, labour progress is assessed through the use of routine vaginal examinations. This intervention is carried out to assess various parameters that have been defined as providing an assessment of progress, including dilation of the cervical os, as well as consistency and position of the cervix, and position and descent of the fetal presenting part. Routine vaginal examinations are carried out at set timings, the frequency of which varies between countries, institutions, and providers. Both the National Institute for Health and Care Excellence (NICE) and the World Health Organization (WHO) recommend four-hourly vaginal examinations (NICE 2017; WHO 2018). In many settings the findings of vaginal examinations are plotted on a partograph, which is an electronic or paper document that can be used to record maternal and fetal observations, providing a graphical overview of labour progress that is then used to guide decision-making (Lavender 2018).

Other methods can be used to assess labour progress. These include assessment of the behaviours women exhibit secondary to hormonal changes as labour progresses (Burville 2002; Dixon 2013a); measurement of the 'purple line' or 'anal cleft line' that is seen to lengthen between the maternal buttocks as labour progresses (Shepherd 2010); intrapartum ultrasound, which assesses cervical dilation and various aspects of fetal head descent, usually through transperineal measurements (Mohan 2019; Usman 2018a); and vaginal examination as indicated, where vaginal examination is carried out according to clinical need or on maternal request (Simkin 2017). In some countries, rectal examinations may be used to assess labour progress (Gao 2008). The optimal approach to assessing labour progress, which combines both effectiveness and feasibility, as well as the needs and preferences of women, has not yet been established.

Description of the condition

Assessment of labour progress is undertaken to ensure that labour is progressing as expected, and to provide an indication where labour is beginning to stall. Pathologically slow labour is associated with maternal and fetal morbidity and mortality, particularly in low-income countries (Harrison 2015). Regular assessment of labour progress can act as an early warning system for labours that are becoming pathological. This may be particularly important in low-income countries, where women are labouring remotely from specialist units, as early diagnosis of developing problems can enable timely transfer from community settings to hospital care for assessment and intervention where necessary. Early intervention in this situation may contribute to well-being for mother and baby, minimise negative maternal and child sequelae, and improve outcomes in future childbearing (Harrison 2015). However, recent studies have demonstrated that ‘slow but normal’ labour is not a risk for most mothers and neonates (Lundborg 2020; Oladapo 2018a), and overdiagnosis of dystocia can also lead to iatrogenic morbidity due to the use of interventions such as oxytocin to augment labour, or caesarean section to expedite birth (Bernitz 2014; Neal 2015). Any tool to assess labour progress should therefore be both reliably sensitive to true dystocia, and specific enough to only identify a labour as dystocic when it is truly pathological.

Labour dystocia is currently very poorly defined, and the threshold for and determinants of its diagnosis are highly variable between different settings and healthcare providers (Neal 2015). The WHO provides the following definition of dystocia: "abnormally slow labor progress arising from inefficient uterine contractions, abnormal fetal presentation or position, inadequate bony pelvis, or abnormalities of the pelvic soft tissues of the mother" (WHO 2014).

Two distinct mechanisms underlying dystocia have been described (Karaçam 2014): a mechanical obstructive dystocia that is still common in low-income countries; and a functional dystocia caused by insufficient or reduced uterine contractions, which is the more common scenario in high-income countries. It is possible that this latter situation could be resolved through mechanisms other than interventions to expedite birth (such as mobility and hydration) depending on the underlying cause (Karaçam 2014; Simkin 2017). The use of routine vaginal examinations alone to monitor labour progress may not incorporate sufficient understanding to make such distinctions.

Defining normal progress of labour

As vaginal examination is the principle assessment method used in most settings, progress in labour is defined to varying extents by cervical dilation, based on the development of graphical representations of cervical dilation over time (Friedman 1954; Friedman 1955). These graphical representations of labour progress result in expected time frames for birth, yet it has proven difficult to define the length of normal labour or any threshold at which it may become pathological (Downe 2009).

NICE guidelines for intrapartum care define labour as occurring in stages and phases (NICE 2017). The first stage is divided into a latent phase with painful contractions and cervical dilation up to four centimetres, and an active or established phase after four centimetres of dilation of the cervical os. The second stage is described as activity beyond full dilation (defined as cervical dilation of 10 centimetres) and ending with the birth of the baby. NICE advises vaginal examination every four hours throughout the established first stage of labour, and that delay should be suspected or diagnosed if cervical dilation is slower than expected, or birth does not occur within the expected time (NICE 2017). In this case, intervention may be offered with the aim of expediting birth.

However, recent evidence demonstrates that population norms cannot be used to predict the duration of labour, that dilation rates are variable between individual women, and that neither cervical dilation or length of labour is predictive of adverse birth outcomes in the absence of other signs of maternal or fetal pathology (Abalos 2020; Ferazzi 2015; Lundborg 2020; Oladapo 2018a; Souza 2018). It is also increasingly recognised that factors other than cervical dilation are much more likely to be important in determining and identifying risk to well-being (Lundborg 2020; Souza 2018). The recently published WHO Labour Care Guide reflects this evidence demonstrating the non-linear and non-standard nature of labour progress (WHO 2020), providing guidance for assessing dilation based on the dynamic nature of cervical dilation (Hofmeyr 2021). However, routine four-hourly vaginal examinations still form the basis of labour progress assessments (NICE 2017; WHO 2018; WHO 2020), and other methods of assessing progress have not yet

been incorporated into international guidance. The four-hourly frequency for routine vaginal examinations is based on expert consensus rather than evidence of effectiveness (WHO 2018).

Description of the intervention

Vaginal examination

As an intrusive procedure, this assessment should only be carried out following fully informed consent. It is usually (but not always) undertaken with the women lying in a supine, semi-recumbent or lateral position, though it can be undertaken with the woman in a forward-leaning position. Appropriate infection control techniques should be used, and the healthcare practitioner should then gently insert two fingers into the vagina to undertake the assessment. The procedure primarily assesses how far the uterine cervix has thinned and dilated, but also how far the fetal presenting part has descended into the maternal pelvis, if the fetal membranes are intact, how closely they are applied to the fetal presenting part, how far they come under pressure with a contraction, and the position and degree of flexion of the fetal presenting part in relation to the maternal pelvis.

The full components of the vaginal examination can be summed up as follows (Simkin 2017).

The cervix:

- Position of the cervical os (posterior to anterior)
- Consistency of the cervix (from hard to soft)
- Effacement of the cervix (from thick to thin)
- Dilation of the cervical os (from 0 to 10 centimetres, nominally)

The fetal presenting part:

- Degree of rotation (to the anterior)
- Degree of flexion (from deflexed to flexed)
- Amount of moulding (if cephalic)
- Degree of descent into the maternal pelvis

State of the amnion:

- Intact or not
- Degree of application to the presenting part of the fetus
- Degree of bulging when under pressure from a contraction

Timing of vaginal examinations

Whilst guidelines stipulate four-hourly routine vaginal examinations, and more frequent assessment only if clinically indicated (NICE 2017; WHO 2018; WHO 2020), in practice routine vaginal examinations may often be carried out more frequently than this (de Klerk 2017; Shepherd 2013). Vaginal examinations can also be carried out as indicated, rather than in all labours according to predefined time intervals. In such a situation, they are undertaken as the need for the above information arises, or on maternal request (Simkin 2017).

Adverse effects of vaginal examinations

There are concerns related to the use of vaginal examinations to assess progress in labour, including the potential to introduce infection (Gluck 2020; Knudston 2010), and that for many women the procedure can be humiliating, painful, or traumatic (Hassan 2012; Reed 2017; Teskereci 2020). In some contexts their use may be an important barrier to facility birth (WHO 2018). Many report that their consent is not sought prior to the procedure (Bohren 2019), violating both human rights, and, in some countries, legal requirements (DOH 2009). Relying on cervical dilation alone to determine whether progress is normal can result in the use of interventions such as oxytocin and emergency caesarean section to expedite birth, where this may be unnecessary (Oladapo 2018a; Souza 2018). Diagnosis of dystocia and the consequent use of interventions is highly variable between settings and practitioners, indicating both overdiagnosis and the need for evidence-based consensus around what represents pathological progress (Neal 2015). These interventions can have highly detrimental impacts on birth experiences and short- and long-term physical and psychological well-being (Khajehei 2017; Reed 2017; Rowlands 2012; Sandall 2018).

Other techniques for assessing progress in labour

Ultrasound

Intrapartum ultrasound is increasingly proposed as a strategy to assess progress in labour (Hassan 2014; Mohan 2019; Tang 2021; Usman 2018a). This involves the use of an ultrasound probe (transabdominal or transperineal) to visualise various parameters of labour progress, including cervical dilation, head-perineum distance, and angle of progression of the presenting part. It has been suggested that ultrasound is a more objective assessment of markers of labour progress than vaginal examinations, with less inter-/intra-observer error (Benediktsdottir 2018; Van Andrichem 2018). Recent evidence suggests that women may find this method of assessment more acceptable than vaginal examination (Rizzo 2019; Usman 2018b; Wiafe 2020).

Externally observed physical and behavioural changes

Externally observed physical and behavioural changes include the purple line and other external physical and/or behavioural changes that may indicate progression of labour (Burville 2002; Dixon 2005; Shepherd 2010). The purple line is thought to be due to venous congestion in the sacral area as the fetal presenting part descends, which causes the gradual development and progression of a purple- or red-coloured line from the anal margin upward between the buttocks. Monitoring the progression of this line may be an effective means of assessing labour progress, especially for women who are upright and mobile during labour (Irani 2018; Kordi 2014; Shepherd 2010).

Other externally observed physical changes include changes in contractions, changes in cervical mucus, and fetal descent palpated abdominally (Burville 2002). Behavioural cues include patterns of breathing, vocalisations, alterations in mood, and changes in movement, particularly during contractions (Burville 2002; Dixon 2005). These signs are likely to be the result of altering hormone levels, and the different effort levels needed, as labour progresses (Buckley 2015; Dixon 2013a). There appear to be few disadvantages for women and babies in the use of approaches that assess progress with these techniques; however, their effectiveness in assessing progress in labour, and their acceptability to women, is not yet established.

Rectal examinations

In some countries, rectal examinations may be used to assess cervical dilation (Gao 2008). A randomised controlled trial designed to assess maternal discomfort with rectal examinations compared to vaginal examinations concluded that women had a clear preference for vaginal examinations over rectal examinations (Murphy 1986); however, there appears to be no recent research relating to rectal examinations, and it is unclear how accurate this method is, or in what context, if any, it is currently used.

How the intervention might work

Routine vaginal examinations

There are multilevel hormonal processes underlying labour and birth and multiple environmental, psychological and psychosocial modulators and outcomes of these (Buckley 2015; Dixon 2013a). Assessing and managing progress through the use of routine vaginal examination is unlikely to incorporate or allow for understanding of these complex underlying processes and their multilevel outcomes. Furthermore, assessing progress based on population norms for cervical dilation does not reflect observational or experiential knowledge of progress, which illustrates the variable and unpredictable nature of cervical dilation and labour progress for individual women (Oladapo 2018a; Scammel 2014; Souza 2018). This may require an individualised assessment of progress that considers multiple factors, including the woman's past maternity and familial maternity history, as well as current environmental and psychological factors that may impact on progress, with knowledge of the woman's own preferences and needs. This kind of individualised assessment is more likely with one-to-one care and within relational models such as continuity models of care (Dixon 2005), and in home birth and midwifery-led settings (Dahlen 2020). It may be that this level of understanding is more difficult to achieve without prior knowledge of the woman and her individual needs, and it is unlikely to be feasible where one-to-one care cannot be provided.

Whilst population norms for cervical dilation do not provide a reliable indicator of future progress, it may be that routine vaginal examination carried out by the same practitioner provides a general assessment of individual progress that can, through routine assessment, pick up on signs of dystocia that in some settings and contexts would otherwise be missed. It also provides a standardised measure of progress that can be easily communicated between, and understood by, the range of practitioners who might be involved in supporting a woman in labour, and in deciding and agreeing if dystocia is present or not. Knowing how labour is progressing is also likely to be important for many women. Where vaginal examinations are carried out by a known or trusted healthcare provider, this assessment can provide women with information that has become a socioculturally important indicator of how labour is progressing (Dixon 2013b).

Why it is important to do this review

The previous version of this review concluded that there was no evidence to support or reject the routine use of vaginal examinations to improve outcomes for women and babies (Downe 2013). Since then, the WHO has updated their guidelines for intrapartum care (WHO 2020), reflecting mounting evidence demonstrating the variable nature of labour progress for individual women (Ferazzi 2015; Lundborg 2020; Oladapo 2018a). Furthermore, a significant body of evidence relating to ultrasound as a method to assess progress in labour has accumulated (Mohan 2019; Seval 2016; Tang 2021; Usman 2018a; Wiafe 2016), including the development of an ultrasound-specific partograph (the sonopartogram) (Hassan 2014).

Murray Enkin, an editor of *Effective Care In Pregnancy and Childbirth* (Chalmers 1989), states that "... repeated vaginal examinations are an invasive intervention of as yet unproven value ..." on the basis of the research evidence that was available then (Enkin 1992). In the 2013 version of this review, the conclusions reached by Enkin remained unchanged (Downe 2013).

Women have the right to accept or decline vaginal examinations, or any other labour assessment technique, and to discuss with their caregivers how their labour progress might be assessed. Both women and practitioners need good information on the benefits and harms of vaginal examinations, and of alternative assessment methods, in order to make informed decisions. Given the potential adverse impacts of vaginal examinations, and the possibility of ultrasound and/or other physical/behavioural methods to assess labour progress, it is necessary and timely to update this review to establish the effectiveness and acceptability of vaginal examination compared to other methods used to assess labour progress.

This review compared the effectiveness, acceptability, and consequences of routine vaginal examinations compared with other methods to assess progress during labour at term.

OBJECTIVES

To compare the effectiveness, acceptability, and consequences of routine vaginal examinations compared with other methods, or different timings, to assess labour progress at term.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials (RCTs) of vaginal examinations compared with other methods of assessing labour progress. We also included studies assessing different timings of vaginal examinations. Quasi-RCTs and cluster-RCTs were eligible for inclusion. We excluded cross-over trials and conference abstracts where there was no full publication. We also excluded trials with a primary focus on assessing progress of labour using the partograph (of which vaginal examinations is one component), as this is covered by another Cochrane Review (Lavender 2018). However, studies where vaginal examinations were used within the context of the partograph were included if the studies were randomised according to the vaginal examination component.

Types of participants

Women entering labour at term, either spontaneously or with induction. Women booked for elective caesarean section and women in preterm labour were excluded.

Types of interventions

Vaginal examinations (including: assessment of the consistency of the cervix, and the degree of dilation and position of the cervical os; and position and station of the fetal presenting part, with or

without abdominal palpation) were assessed for effectiveness. We included any frequency of vaginal examinations. We planned to assess the effect of frequency of the vaginal examination with direct comparisons.

We compared routine four-hourly vaginal examinations to the following methods to assess labour progress:

- intrapartum ultrasound;
- externally observed physical and behavioural changes (including purple line observation);
- rectal examination;
- different frequencies of routine vaginal examinations;
- vaginal examinations as indicated (according to clinical need or on maternal request).

Comparisons to be studied

Comparison 1: Routine vaginal examination (any frequency) versus routine ultrasound (subgroup by parity).

Comparison 2: Routine vaginal examination (any frequency) versus routine ultrasound (subgroup by country income).

Comparison 3: Routine vaginal examination (any frequency) versus externally observed physical and behavioural changes (subgroup by parity).

Comparison 4: Routine vaginal examination (any frequency) versus externally observed physical and behavioural changes (subgroup by country income).

Comparison 5: Routine vaginal examination (any frequency) versus routine rectal examination (subgroup by parity).

Comparison 6: Routine vaginal examination (any frequency) versus routine rectal examination (subgroup by country income).

Comparison 7: Routine vaginal examination four-hourly versus routine vaginal examination two-hourly (subgroup by parity).

Comparison 8: Routine vaginal examination four-hourly versus routine vaginal examination two-hourly (subgroup by country income).

Comparison 9: Routine vaginal examination versus vaginal examination as indicated (subgroup by parity).

Comparison 10: Routine vaginal examination versus vaginal examination as indicated (subgroup by country income).

Country income group was determined from the World Bank Economic Classification Database in the year of the study (The World by Income and Region).

Types of outcome measures

A positive birth experience is a priority outcome for this review. Positive birth experiences have been identified as integral to what matters to women about labour and birth (Downe 2018), and subsequently have become an intrinsic component of WHO recommendations for intrapartum care (WHO 2018; WHO 2020). A positive childbirth experience is defined as one that "fulfils or exceeds a woman's prior personal and sociocultural beliefs and expectations, including giving birth to a healthy baby in a clinically and psychologically safe environment with continuity of practical and emotional support from a birth companion(s) and kind, technically competent clinical staff. It is based on the premise that most women want a physiological labour and birth, and to have a sense of personal achievement and control through involvement in decision-making, even when medical interventions are needed or wanted" (Downe 2018; WHO 2018).

The WHO has specified a package of recommendations and principles for intrapartum care, that when used together, are critical to ensuring that birth is safe and that it is also a positive birth experience. However, a tool or other methods to measure positive birth experience have not yet been established. For the purposes of this review, maternal birth experience outcomes will be used as measures of positive birth experience. As defined by WHO 2018, these may include qualitative or quantitative experiential outcomes, including maternal satisfaction with care, sense of control, psychological assessments following birth, and ratings of childbirth experience. There is a need for further exploration of how positive birth experience can optimally be assessed.

Primary outcomes

- Positive birth experience
- Augmentation of labour
- Spontaneous vaginal birth
- Chorioamnionitis
- Neonatal infection (as defined by study authors)
- Admission to neonatal intensive care unit (NICU)
- Maternal pain (as defined by study authors)

Secondary outcomes

For mothers

- Physiological labour and birth
- Caesarean birth
- Operative vaginal birth
- Length of labour (in hours)
- Epidural for pain relief
- Narcotics for pain relief
- Maternal infection (as defined by study authors)
- Postpartum haemorrhage (PPH) (≥ 1000 mL)
- PPH (≥ 500 mL)
- Severe perineal/vaginal trauma or anal sphincter damage
- Urinary incontinence at six weeks postnatal or beyond
- Breastfeeding/mixed feeding up to six weeks postpartum
- Postnatal depression (PND) or birth trauma/post-traumatic stress disorder (PTSD)
- Women's preferences for the intervention in future
- Maternal mortality or severe morbidity

For neonates/infants

- Apgar < 7 at 5 minutes
- Neonatal resuscitation
- Neonatal fitting/seizures
- Hypoxic ischaemic encephalopathy (HIC)
- Perinatal mortality
- Severe perinatal morbidity

Additional non-prespecified outcomes

- Maternal anxiety
- Maternal comfort

Search methods for identification of studies

The following methods section is based on a standard template used by Cochrane Pregnancy and Childbirth.

Electronic searches

For this update, we searched Cochrane Pregnancy and Childbirth (CPC) Trials Register by contacting their Information Specialist (28 February 2021). The Register is a database containing over 27,000 reports of controlled trials in the field of pregnancy and childbirth and represents over 30 years of searching. For full current search methods used to populate CPC Trials Register, including detailed search strategies for CENTRAL, MEDLINE, Embase, and CINAHL; the list of handsearched journals and conference proceedings; and the list of journals reviewed via the current awareness service, please follow this link.

Briefly, CPC Trials Register is maintained by their Information Specialist and contains trials identified from:

1. monthly searches of the Cochrane Central Register of Controlled Trials (CENTRAL), which contains the results of Cochrane centralised searching of the WHO International Clinical Trials Registry Platform (apps.who.int/trialsearch/);
2. weekly searches of MEDLINE (Ovid);
3. weekly searches of Embase (Ovid);
4. monthly searches of CINAHL (EBSCO) (Cumulative Index to Nursing and Allied Health Literature);
5. handsearches of 30 journals and the proceedings of major conferences;
6. weekly current awareness alerts for a further 44 journals plus monthly BioMed Central email alerts.

Search results were screened by two people and the full text of all relevant trial reports identified through the searching activities described above were reviewed. Based on the intervention described, each trial report was assigned a number that corresponds to a specific Pregnancy and Childbirth review topic (or topics), and was then added to the Register. The Information Specialist searched the Register for each review using this topic number rather than keywords. This resulted in a more specific search set that has been fully accounted for in the relevant review sections (included, excluded, awaiting classification, or ongoing).

In addition, we searched the US National Institutes of Health Ongoing Trials Register ClinicalTrials.gov (clinicaltrials.gov/) for unpublished, planned, and ongoing trial reports (28 February 2021) using the search methods detailed in Appendix 1.

Searching other resources

We searched the reference sections of identified studies.

We did not apply any language restrictions.

Data collection and analysis

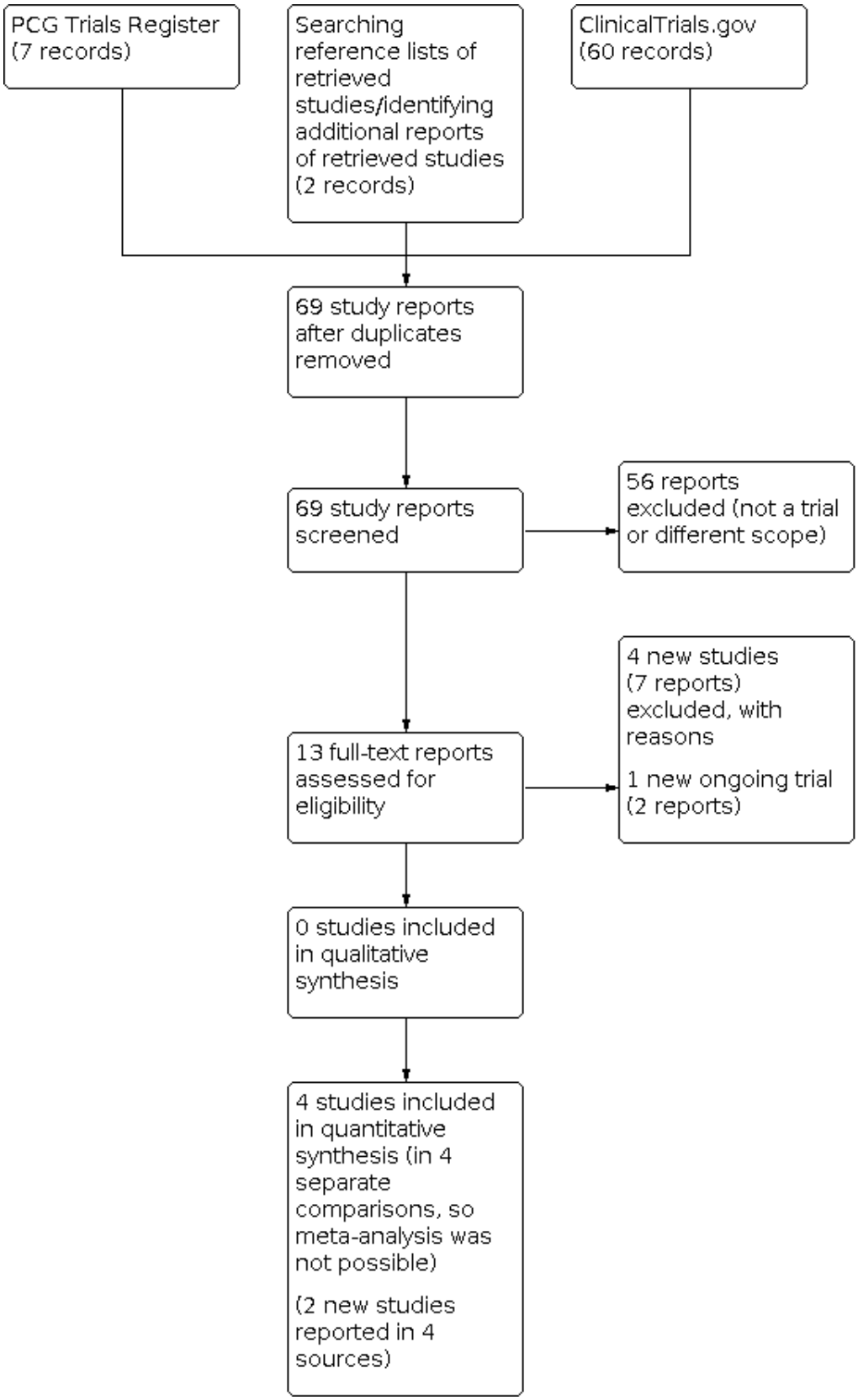
Two review authors independently assessed all trials for inclusion. Four review authors independently extracted data. Two review authors assessed risk of bias and certainty of the evidence using GRADE.

Selection of studies

Two review authors independently assessed all the studies identified by the search for inclusion in the review. Any disagreements were resolved through discussion and consultation with other co-authors.

We created a PRISMA study flow diagram to map out the number of records identified, included, excluded, awaiting classification, or ongoing (Figure 1).

Figure 1. Study flow diagram.



Screening eligible studies for scientific integrity/trustworthiness

Two review authors evaluated all studies meeting our inclusion criteria against predefined criteria to select studies that, based on the available information, were sufficiently trustworthy to be included in the analysis. Cochrane Pregnancy and Childbirth have developed a Trustworthiness Screening Tool (CPC-TST), which includes the following criteria.

Research governance

- Are there any retraction notices or expressions of concern listed on the Retraction Watch Database relating to this study?
- Was the study prospectively registered (for those studies published after 2010)? If not, was there a plausible reason?
- When requested, did the trial authors provide/share the protocol and/or ethics approval letter?
- Did the trial authors engage in communication with the Cochrane Review authors within the agreed timelines?
- Did the trial authors provide individual patient data upon request? If not, was there a plausible reason?

Baseline characteristics

- Is the study free from characteristics of the study participants that appear too similar (e.g. distribution of the mean (standard deviation) excessively narrow or excessively wide, as noted by Carlisle 2017)?

Feasibility

- Is the study free from characteristics that could be implausible (e.g. large numbers of women with a rare condition (such as severe cholestasis in pregnancy) recruited within 12 months)?
- In cases with (close to) zero losses to follow-up, is there a plausible explanation?

Results

- Is the study free from results that could be implausible (e.g. massive risk reduction for main outcomes with small sample size)?
- Do the numbers randomised to each group suggest that adequate randomisation methods were used (e.g. is the study free from issues such as unexpectedly even numbers of women 'randomised' including a mismatch between the numbers and the methods, if the authors say 'no blocking was used' but still end up with equal numbers, or if the authors say they used 'blocks of 4' but the final numbers differ by 6)?

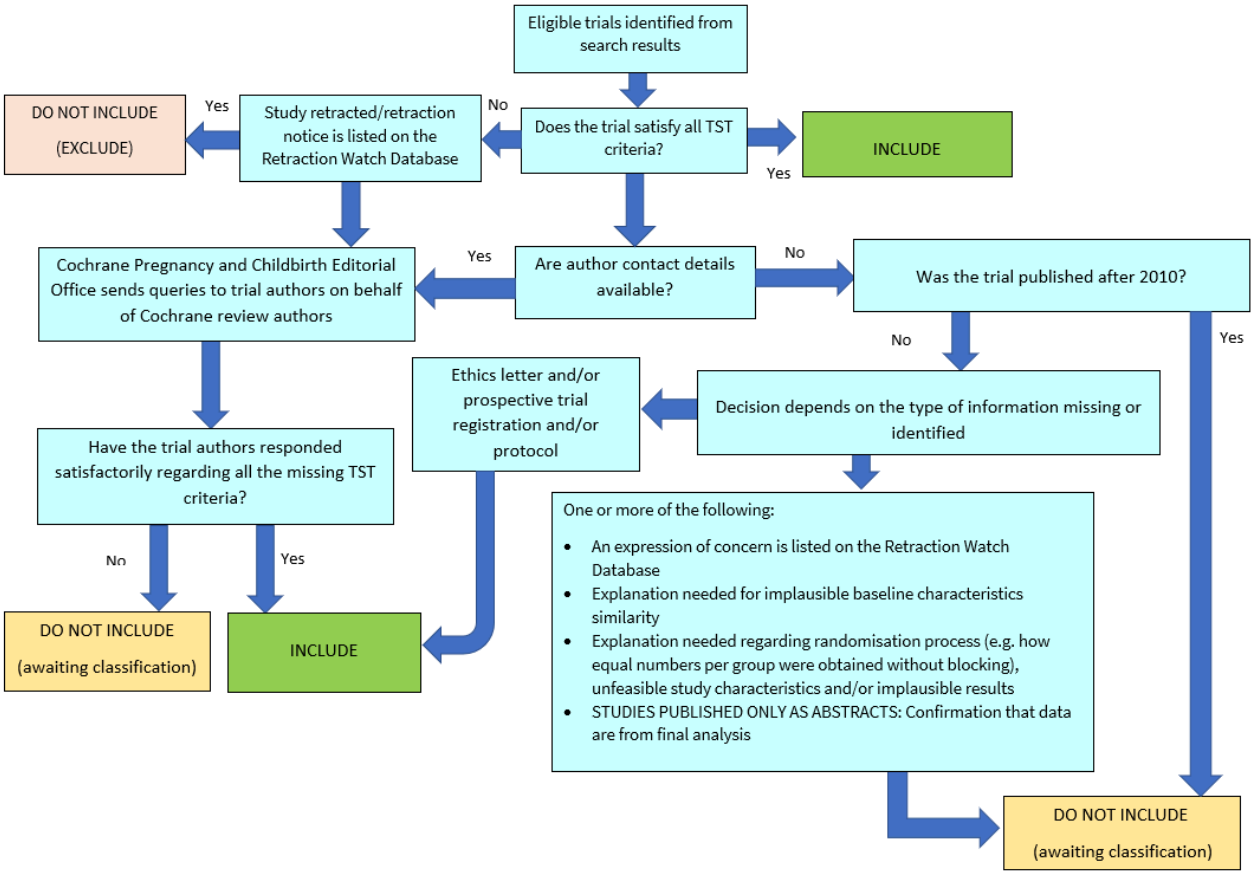
Where a study was classified as 'high risk' for one or more of the above criteria, we would attempt to contact the study authors to address any possible lack of information/concerns. If information was still insufficient, the study would be assessed as awaiting classification, and the reasons and communications with the author (or lack thereof) would be described in detail.

Abstracts

We did not identify any studies only available in abstract form. In future updates, we will include data from abstracts only if, in addition to the trustworthiness assessment, the study authors have confirmed in writing that data to be included in the review have come from the final analysis and will not change. If such information is not available/provided, we will assess the study as awaiting classification (as above).

See Figure 2 for details of how we applied the trustworthiness screening criteria.

Figure 2. Applying the Trustworthiness Screening Tool (TST) criteria.



Data extraction and management

We designed a data extraction form. Four review authors (GG, HD, GT, MS) extracted data from the included studies using the agreed-upon form, with any discrepancies resolved through discussion. We entered data into Review Manager 5 software (Review Manager 2020), which two review authors (GG and GM) checked for accuracy.

Assessment of risk of bias in included studies

Two review authors (GG and GM) independently assessed risk of bias for each study using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2019). Any uncertainties were resolved by discussion with a third review author (SD). To date, we have found no cluster-randomised trials, but should we identify any in future updates, we will include them and use the guidance in the *Cochrane Handbook* to assess risk of bias (Higgins 2019).

(1) Sequence generation (checking for possible selection bias)

We described for each included study the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.

We assessed the method as:

- low risk of bias (any truly random process, e.g. random number table; computer random number generator);
- high risk of bias (any non-random process, e.g. odd or even date of birth; hospital or clinic record number);
- unclear risk of bias.

(2) Allocation concealment (checking for possible selection bias)

We described for each included study the method used to conceal the allocation sequence and determined whether intervention allocation could have been foreseen in advance of, or during recruitment, or changed after assignment.

We assessed the methods as:

- low risk of bias (e.g. telephone or central randomisation; consecutively numbered, sealed, opaque envelopes);
- high risk of bias (open random allocation; unsealed or non-opaque envelopes, alternation; date of birth);
- unclear risk of bias.

(3.1) Blinding of participants and personnel (checking for possible performance bias)

We described for each included study the methods used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. We considered that studies are at low risk of bias if they were blinded, or if we judged that the lack of blinding would be unlikely to affect results. We assessed blinding separately for different outcomes or classes of outcomes.

We assessed the methods as being:

- low, high or unclear risk of bias for participants;
- low, high or unclear risk of bias for personnel.

(3.2) Blinding of outcome assessment (checking for possible detection bias)

We described for each included study the methods used, if any, to blind outcome assessors from knowledge of which intervention a participant received. We assessed blinding separately for different outcomes or classes of outcomes.

We assessed methods used to blind outcome assessment as:

- low, high or unclear risk of bias.

(4) Incomplete outcome data (checking for possible attrition bias through withdrawals, dropouts, protocol deviations)

We described for each included study, and for each outcome or class of outcomes, the completeness of data including attrition and exclusions from the analysis. We stated whether attrition and exclusions were reported, the numbers included in the analysis at each stage (compared with the total randomised participants), reasons for attrition or exclusion where reported, and whether missing data were balanced across groups or were related to outcomes. Where sufficient information was reported, we re-included missing data in the undertaken analyses. If further information can be supplied from the trial authors, we will include the relevant data in future updates.

We assessed the methods as:

- low risk of bias;
- high risk of bias;
- unclear risk of bias.

Where there were missing data greater than 20%, we discussed the possible impact. Where in future updates of this review this may occur with long-term outcomes, we acknowledge that such data may be difficult to attain.

(5) Selective reporting bias

We described for each included study how we investigated the possibility of selective outcome reporting bias and what we found.

We assessed the methods as:

- low risk of bias (where it is clear that all of the study's prespecified outcomes and all expected outcomes of interest to the review have been reported);
- high risk of bias (where not all of the study's prespecified outcomes have been reported; one or more reported primary outcomes were not prespecified; outcomes of interest are reported incompletely and so cannot be used; the study fails to include results of a key outcome that would be expected to have been reported);
- unclear risk of bias.

(6) Other sources of bias

We described for each included study any important concerns we had about other possible sources of bias (e.g. whether the study was stopped early and reporting the reason; baseline imbalances; and differential diagnoses).

We assessed whether each study was free of other problems that could put it at risk of bias using a judgement of:

- low risk of bias;
- high risk of bias;
- unclear risk of bias.

(7) Overall risk of bias

We made explicit judgements as to whether studies were at high risk of bias, according to the criteria provided in the *CochraneHandbook* (Higgins 2019). With reference to (1) to (6) above, we assessed the likely magnitude and direction of the bias and whether we considered it likely to have impacted on the findings. We would explore the impact of this level of bias through the undertaking of sensitivity analyses (Sensitivity analysis), if necessary.

Measures of treatment effect

We conducted the statistical analysis using Review Manager 5 software (Review Manager 2020).

Dichotomous data

For dichotomous data, we presented results as summary risk ratio with 95% confidence intervals.

Continuous data

For continuous data, we used the mean difference if outcomes were measured in the same way between trials. We used the standardised mean difference to combine trials that used different methods to measure the same outcome.

Unit of analysis issues

Cluster-randomised trials

We did not find any eligible cluster-randomised trials. If we identify any in future updates, we will include these in the analyses along with individually randomised trials. We will apply the methods described in the *CochraneHandbook* (Higgins 2019), using an estimate of the intracluster correlation coefficient (ICC) derived from the trial (if possible), from a similar trial, or from a study of a similar population. If we use ICCs from other sources, we will report this and conduct sensitivity analyses to investigate the effect of variation in the ICC. If we identify both cluster-randomised trials and individually randomised trials, we will synthesise the relevant information with the help of a statistician. We will consider it reasonable to combine the results from both if there is little heterogeneity between the study designs, and interaction between the effect of intervention and the choice of randomisation unit is considered to be unlikely. We will also acknowledge heterogeneity in the randomisation unit and perform a sensitivity analysis to investigate the effects of the randomisation unit.

Dealing with missing data

We noted levels of attrition in the included studies. We planned to explore the impact of including studies with high levels of missing data in the overall assessment of treatment effect using sensitivity

analysis; however, as we found only one study for each of four comparisons, sensitivity analyses were not possible.

To the greatest degree possible, we carried out analyses for all outcomes on an intention-to-treat basis (i.e. we attempted to include all participants randomised to each group in the analyses, and all participants were analysed in the group to which they had been allocated, regardless of whether or not they received the allocated intervention). The denominator for each outcome in each trial was the number randomised minus any participants whose outcomes were known to be missing.

We identified one study where more than 20% of data were lost due to exclusions (Abukhalil 1996); however, we could not explore this by sensitivity analyses as this was the only study in that comparison (Comparison 7 and 8) (see Sensitivity analysis). In none of the studies were participants analysed in the wrong groups.

Assessment of heterogeneity

In future updates we will assess statistical heterogeneity in each meta-analysis using Tau^2 and the I^2 and Chi^2 statistics. We will regard heterogeneity as substantial if Tau^2 is greater than zero, and either the I^2 is greater than 30%, or there is a low P value (less than 0.10) in the Chi^2 test for heterogeneity.

Assessment of reporting biases

If in future updates there are 10 or more studies in the meta-analysis, we will investigate reporting biases (such as publication bias) using funnel plots. We will visually assess funnel plot asymmetry. If asymmetry is suggested by a visual assessment, we will perform exploratory analyses to investigate it.

Data synthesis

We carried out statistical analysis using Review Manager 5 software (Review Manager 2020). We were unable to perform meta-analysis, as there was only one study for each comparison. In future updates, we will use fixed-effect meta-analysis for combining data where it is reasonable to assume that studies are estimating the same underlying treatment effect (i.e. where trials are examining the same intervention, and the trials' populations and methods are judged as sufficiently similar). If there is clinical heterogeneity sufficient to expect that the underlying treatment effects differ between trials, or if substantial statistical heterogeneity is detected, we will use random-effects meta-analysis to produce an overall summary if an average treatment effect across trials is considered clinically meaningful. The random-effects summary will be treated as the average of the range of possible treatment effects, and we will discuss the clinical implications of treatment effects differing between trials. If the average treatment effect is not clinically meaningful, we will not combine trials.

In future updates where random-effects analyses are used, we will present the results as the average treatment effect with its 95% confidence interval, and the estimates of Tau^2, Chi^2 P value, and I^2 (Higgins 2009).

Subgroup analysis and investigation of heterogeneity

In future updates, if we identify substantial heterogeneity, we will investigate it using subgroup analyses and sensitivity analyses. We will consider whether an overall summary is meaningful, and if so, use random-effects analysis to produce it.

We planned to carry out the following subgroup analyses.

- Primiparous women versus multiparous women (primary outcomes).
- Women in high-income countries (HIC) versus women in low- and middle-income countries (LMIC) (primary outcomes). Country income was determined from the World Bank Economic Classification Database in the year of study (The World by Income and Region).

We intended to assess subgroup differences using interaction tests available in Review Manager 5 and report the results of subgroup analyses quoting the Chi^2 statistic and P values, and the interaction test I^2 value; however, insufficient data precluded this (Review Manager 2020). Nonetheless, we have set out our results in subgroups by parity and country income to facilitate subgroup analyses in subsequent updates, should subgroup data become available.

Sensitivity analysis

In future updates, we will perform sensitivity analysis based on risk of bias, separating trials at high risk from trials of low risk. We defined 'low risk' for the purposes of this sensitivity analysis as a trial having low risk of bias for allocation concealment and attrition (i.e. reasonably expected loss to follow-up classified as less than 20%), given the stated importance of attrition as a quality measure (Tierney 2005).

Summary of findings and assessment of the certainty of the evidence

The included studies evaluated the following comparisons.

- Routine vaginal examinations versus routine ultrasound assessments
- Routine vaginal examinations versus routine rectal examinations
- Routine four-hourly vaginal examinations versus routine two-hourly vaginal examinations
- Routine vaginal examinations versus vaginal examinations as indicated

We also planned to include routine vaginal examinations versus externally observed physical and behavioural changes; however, we did not find any eligible studies evaluating this comparison.

We used the GRADE approach as outlined in the GRADE Handbook to assess the certainty of the body of evidence relating to the following outcomes.

- Positive birth experience
- Augmentation of labour
- Spontaneous vaginal birth
- Chorioamnionitis
- Neonatal infection
- Admission to NICU
- Maternal pain

We used GRADEpro GDT to import data from Review Manager 5 to create summary of findings tables (Review Manager 2020). A summary of the intervention effect and a measure of quality for each of the above outcomes was produced using the GRADE

approach. The GRADE approach uses five considerations (study limitations, consistency of effect, imprecision, indirectness, and publication bias) to assess the certainty of the body of evidence for each outcome. The evidence can be downgraded from high certainty by one level for serious (or by two levels for very serious) limitations, depending on assessments for risk of bias, indirectness of evidence, inconsistency, imprecision of effect estimates, or potential publication bias.

RESULTS

Description of studies

Results of the search

See Figure 1.

For this 2021 update, we assessed 13 new trial reports covering seven new studies. We included two studies previously included in the 2013 review (Abukhalil 1996; Murphy 1986), and two new studies (Seval 2016; Win 2019). We excluded four new studies (Barros 2021; Martin 2021; Popowski 2015; Yaddehige 2015), and one study is ongoing (Oberman 2020).

Screening eligible studies for trustworthiness

We did not have any concerns regarding the trustworthiness of the four included studies.

Included studies

The updated search identified two additional studies for inclusion. The review now includes four studies involving a total of 755 women and their babies (Abukhalil 1996; Murphy 1986; Seval 2016; Win 2019). We analysed data for 744 of these women and their babies.

The study dates ranged from February 1984 to September 2017. Two studies were over 25 years old (Abukhalil 1996; Murphy 1986), and did not report according to current standards. The two new studies were more recent, covering data from 2015 to 2017 (Seval 2016; Win 2019).

We were unable to combine the studies in meta-analyses, as each of the four included studies involved different comparisons.

Design

All of the included studies were parallel RCTs that randomised individual women in ratios of 1:1. Only one study reported block randomisation, using blocks of four and eight (Win 2019). None of the studies were multi-arm, and there were no cluster-randomised trials. No quasi-RCTs were included, although in one of the studies the sequence generation was unclear (Murphy 1986).

Interventions

All of the studies involved routine vaginal examinations, carried out at various intervals, to assess labour progress. Routine vaginal examinations were compared to other methods of assessing labour progress as follows.

- Routine vaginal examinations (two- to four-hourly in the latent phase; one- to two-hourly in the active phase) versus routine transperineal ultrasound (two- to four-hourly in the latent phase; one- to two-hourly in the active phase) (Seval 2016).
- Routine vaginal examinations (two-hourly) versus routine rectal examinations (two-hourly) (Murphy 1986).
- Routine vaginal examinations (four-hourly) versus routine vaginal examinations (two-hourly) (Abukhalil 1996).
- Routine vaginal examinations (four-hourly) versus vaginal examinations as indicated (Win 2019).

Outcomes

The included studies reported the following prespecified outcomes.

Primary outcomes

- Augmentation of labour (Abukhalil 1996; Murphy 1986; Win 2019).
- Spontaneous vaginal birth (Abukhalil 1996; Murphy 1986; Win 2019).
- Chorioamnionitis (Win 2019).
- Neonatal infection (Win 2019).
- Admission to NICU (Murphy 1986; Win 2019).
- Maternal pain (Seval 2016).

Secondary outcomes (for mothers and for infants)

- Caesarean birth (Abukhalil 1996).
- Operative vaginal birth (Abukhalil 1996).
- Length of labour (Abukhalil 1996; Seval 2016; Win 2019).
- Epidural for pain relief (Abukhalil 1996; Win 2019).
- Narcotics for pain relief (Win 2019).
- Maternal infection (Win 2019).
- Postpartum haemorrhage (≥ 500 mL) (Win 2019).
- Women's preference for the intervention in future (Win 2019).
- Apgar score < 7 at 5 minutes (Win 2019).
- Neonatal fitting/seizures (Murphy 1986).
- Perinatal mortality (Murphy 1986).

None of the included studies reported on positive birth experiences for women.

We added 'maternal anxiety' and 'maternal comfort' as outcomes that were not prespecified.

Setting

The included studies were conducted in high- and upper-middle-income countries. They were from Ireland (Murphy 1986), the UK (Abukhalil 1996), Turkey (Seval 2016), and Malaysia (Win 2019).

Funding sources and declarations of interest

None of the studies reported on funding sources.

One study reported no conflicts of interest for the authors (Win 2019), whilst the remaining three studies did not report on conflicts of interest.

Excluded studies

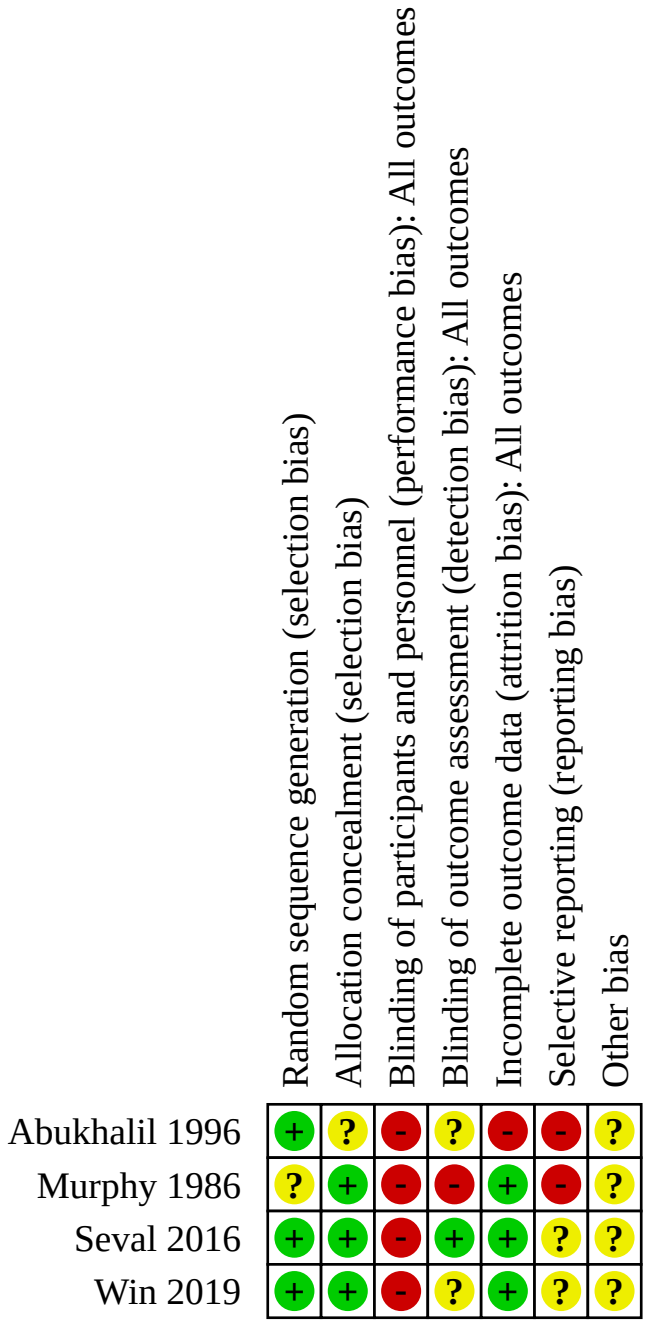
We excluded nine studies. Two studies compared vaginal examinations to ultrasound in the assessment of fetal head position, to establish influence on mode of delivery (Popowski 2015), and incidence of adverse maternal and neonatal outcomes (Barros 2021); three studies explored various aspects of membrane

sweeping (Chanrachakul 2001; Foong 2000; Yaddehige 2015); one study compared different gels used with vaginal examinations to reduce infection (Fuentes 1995); two studies assessed the accuracy of measurement of cervical dilation during vaginal examinations (Dupuis 2005; Martin 2021); and one study had a major imbalance in participants between the two groups (833 versus 653) (Peterson 1965) (see Characteristics of excluded studies).

Risk of bias in included studies

See Figure 3.

Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Allocation

We assessed two studies as at low risk of bias for both sequence generation and allocation concealment (Seval 2016; Win 2019). We assessed one study as at low risk of bias for sequence generation and unclear risk of bias for allocation concealment (Abukhalil 1996), and the fourth study as at unclear risk of bias for sequence generation and low risk of bias for allocation concealment (Murphy 1986).

Blinding

It was not possible to blind participants and clinicians in any of the included studies. Regarding outcome assessors, one study was at low risk (Seval 2016); two studies were at unclear risk (Abukhalil 1996; Win 2019); and the fourth study was at high risk of detection bias (Murphy 1986).

Incomplete outcome data

We assessed three studies as at low risk of attrition bias (Murphy 1986; Seval 2016; Win 2019). In Abukhalil 1996, women were randomised at 32 weeks. Many (27%) then developed conditions (including hypertension, pre-eclampsia, placenta praevia, intrauterine growth restriction, preterm labour, post-term labour, and breech presentation), which meant they were withdrawn from the study. Although a similar number of women were excluded from each group, we felt this could potentially introduce a high risk of bias.

Selective reporting

We judged two studies as at unclear risk of reporting bias, as we did not assess the trial protocols (Seval 2016; Win 2019). We assessed the other two studies as at high risk of reporting bias (Abukhalil 1996; Murphy 1986), as they reported outcomes that were not listed in the methods section of the published paper. We did not assess trial protocols for these studies.

Other potential sources of bias

We assessed all of the included studies as at unclear risk of other bias, as reporting on methods was insufficient.

Effects of interventions

See: **Summary of findings 1** Routine vaginal examination compared to routine ultrasound for assessing progress of labour to improve outcomes for women and babies at term; **Summary of findings 2** Routine vaginal examination compared to routine rectal examination for assessing progress of labour to improve outcomes for women and babies at term ; **Summary of findings 3** Routine 4-hourly vaginal examinations compared to routine 2-hourly vaginal examinations for assessing progress of labour to improve outcomes for women and babies at term; **Summary of findings 4** Routine vaginal examinations compared to vaginal examinations as indicated for assessing progress of labour to improve outcomes for women and babies at term

Routine vaginal examinations versus routine ultrasound examinations (Comparisons 1 & 2: one study, 83 women and babies in the analysis)

We included one study that compared routine vaginal examinations to routine ultrasound to assess labour progress (Seval 2016). This study was undertaken in Turkey (an upper-middle-income country) and included multiparous women in spontaneous labour. Ninety women were randomised for inclusion; data were analysed for 83 of these women. For risk of bias, see Characteristics of included studies.

Primary outcomes

Maternal pain (assessed at the beginning of active labour)

Routine vaginal examinations may result in a slight increase in pain (mean difference (MD) −1.29, 95% confidence interval (CI) −2.10 to −0.48; one study, 83 women) compared to routine ultrasound assessment of labour progress. The certainty of the evidence was low, downgraded for very serious imprecision (Analysis 1.7; Analysis 2.7; Summary of findings 1). It was also unclear from the information provided in this study what the pain assessed was in relation to. Pain was assessed with a visual analogue scale (VAS), which was used in a reverse manner, with zero indicating worst pain and 10 indicating no pain. It is not clear if this was a validated VAS tool.

This study did not assess any of our other primary outcomes: positive birth experience; augmentation of labour; spontaneous vaginal birth; chorioamnionitis; neonatal infection; or admission to NICU.

In this study, women's experiences were reported as "satisfaction" with birth. This measure may be considered to contribute to a positive birth experience; however, data were reported as median and interquartile ranges, therefore we were unable to include these in our analysis.

Secondary outcomes

Length of labour (in hours)

Routine vaginal examination may slightly reduce or make no difference to the length of labour compared with routine ultrasound assessment (MD −2.30, 95% CI −4.66 to 0.06; one study, 83 women; low certainty evidence, downgraded for very serious imprecision; Analysis 1.11). It is unclear whether a reduction in length of labour is beneficial or harmful for women and their babies.

Maternal anxiety (non-prespecified) (assessed at the beginning of active labour)

Routine vaginal examinations may result in little or no difference in anxiety compared with assessment of labour progress by routine ultrasound (MD 2.59, 95% CI −1.63 to 6.81; one study, 83 women; low certainty evidence, downgraded for very serious imprecision; Analysis 1.29). This was not a prespecified outcome; the authors assessed maternal anxiety using the State-Trait Anxiety Inventory (STAI) measure with scores ranging from 20 to 80, where higher scores indicated more severe anxiety states. It is not clear if this was a validated tool or what difference in scores equates to important differences in anxiety.

The study did not assess any of our other secondary outcomes: physiological labour and birth; caesarean birth; operative vaginal birth; epidural for pain relief; narcotics for pain relief; maternal infection; PPH ≥ 1000 mL; PPH ≥ 500 mL; severe perineal/vaginal/anal trauma; urinary incontinence at six weeks postnatal; breastfeeding/mixed feeding up to six weeks

postnatal; PND; women's preference for the intervention in future; maternal mortality or severe morbidity; Apgar score < 7 at 5 minutes; neonatal resuscitation; neonatal fitting/seizures; hypoxic ischaemic encephalopathy; perinatal mortality; severe perinatal morbidity.

Subgroup and sensitivity analyses were not possible as no relevant data were available.

Routine vaginal examination versus physical and behavioural changes (Comparisons 3 & 4: no studies)

We did not find any eligible studies evaluating this comparison.

Routine vaginal examination versus routine rectal examination (Comparisons 5 & 6: one study, 307 women and babies in the analysis)

We included one study that compared routine vaginal examinations to routine rectal examinations to assess labour progress (Murphy 1986). In this study, 310 women were randomised, and data were reported for 307 women and babies. The study was undertaken in Ireland (a high-income country), and included women of mixed parity in labour at term. For risk of bias, see Characteristics of included studies.

Primary outcomes

Augmentation of labour

It was unclear whether there was any difference in augmentation of labour for routine vaginal examinations compared to routine rectal examinations (risk ratio (RR) 1.03, 95% CI 0.63 to 1.68; one study, 307 women). The certainty of the evidence was very low, downgraded for very serious risk of bias and very serious imprecision (Analysis 5.2; Analysis 6.2; Summary of findings 2).

Spontaneous vaginal birth

The evidence is very uncertain regarding the effect of routine vaginal examinations versus routine rectal examinations on the number of women having a spontaneous vaginal birth (RR 0.98, 95% CI 0.90 to 1.06; one study, 307 women). The certainty of the evidence was very low, downgraded for very serious risk of bias and serious imprecision (Analysis 5.3; Analysis 6.3; Summary of findings 2).

Neonatal infection

Data were insufficient to assess this outcome, with only one event (group B *Streptococcus* infection) (RR 0.33, 95% CI 0.01 to 8.07; one study, 307 babies). The certainty of the evidence was very low, downgraded for very serious risk of bias and very serious imprecision (Analysis 5.5; Analysis 6.5; Summary of findings 2).

Admission to NICU

Data were insufficient to assess this outcome, as there were only 14 events (RR 1.32, 95% CI 0.47 to 3.73; one study, 307 babies). The certainty of the evidence was very low, downgraded for serious risk of bias and very serious imprecision (Analysis 5.6; Analysis 6.6; Summary of findings 2).

The study did not report on the following primary outcomes: positive birth experience; maternal pain; or chorioamnionitis.

Secondary outcomes

Caesarean birth

There was insufficient data to assess if there were more caesarean births with routine vaginal examinations compared to routine rectal examinations, with only four events (RR 0.33, 95% CI 0.03 to 3.15; one study, 307 women; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 5.9).

Operative vaginal birth

The evidence is very uncertain regarding the effect of routine vaginal examinations or routine rectal examinations on the number of women having operative vaginal births, with data being compatible with a very wide range of effects including both substantial benefit and substantial harm (RR 1.38, 95% CI 0.70 to 2.71; one study, 307 women; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 5.10).

Perinatal mortality

Data were insufficient to assess if there were more perinatal deaths in women who have routine vaginal examinations compared to routine rectal examinations, with only two events (RR 0.99, 95% CI 0.06 to 15.74; one study, 307 babies; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 5.27).

Maternal comfort (non-prespecified outcome)

Routine vaginal examination may increase the number of women who find the procedure "not-uncomfortable" compared with routine rectal examinations (RR 2.68, 95% CI 1.64 to 4.39; one study, 303 women; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 5.30). This outcome was not prespecified; the authors assessed maternal comfort on a scale ranging from very uncomfortable to not uncomfortable. It is not clear if this was a validated tool.

The study did not assess any of our other secondary outcomes: physiological labour and birth; narcotics for pain relief; maternal infection; PPH ≥ 1000 mL; PPH ≥ 500 mL; severe perineal/vaginal/anal trauma; urinary incontinence at six weeks postnatal; breastfeeding/mixed feeding up to six weeks postnatal; PND; women's preference for the intervention in future; maternal mortality or severe morbidity; Apgar score < 7 at 5 minutes; neonatal resuscitation; neonatal fitting/seizures; hypoxic ischaemic encephalopathy; severe perinatal morbidity.

Subgroup and sensitivity analyses were not possible as no relevant data were available.

Routine vaginal examinations, four-hourly versus two-hourly (Comparison 7 & 8: one study, 150 women and babies in the analysis)

We included one study that compared routine four-hourly with routine two-hourly vaginal examinations (Abukhalil 1996). The study was undertaken in the UK (a high-income country) and included 150 primiparous women in labour at term, with data reported on 150 women and babies. For risk of bias, see Characteristics of included studies. There was exclusion of 28% (four-hourly group) and 27% (two-hourly group) of participants

following randomisation. This appears to be due to women being randomised at 32 weeks' gestation, with many women then developing conditions that meant they no longer met the inclusion criteria, prior to onset of labour being diagnosed by the healthcare professionals involved. Mode of birth data was reported for all women as randomised at 32 weeks' gestation; however, the other outcomes were reported following these exclusions. Although the exclusions were similar in each group, we considered these exclusions to be a serious design flaw that increased the risk of bias. The authors of the study also note many deviations from protocol, which meant that there was little difference in time interval between examinations for the two groups.

Primary outcomes

Augmentation of labour

The impact of four-hourly vaginal examinations compared with two-hourly vaginal examinations on the number of women having their labour augmented was very unclear, with data compatible with a very wide range of effects (RR 0.97, 95% CI 0.60 to 1.57; one study, 109 women). The certainty of the evidence was very low, downgraded for very serious risk of bias and very serious imprecision (Analysis 7.2; Analysis 8.2; Summary of findings 3).

Spontaneous vaginal birth

There may be little or no difference in the effect of four-hourly vaginal examinations compared with two-hourly vaginal examinations on the number of women having a spontaneous vaginal birth, with data compatible with both benefit and harm (RR 1.02, 95% CI 0.83 to 1.26; one study, 150 women). The certainty of the evidence was very low, downgraded for very serious risk of bias and serious imprecision (Analysis 7.3; Analysis 8.3; Summary of findings 3).

There were no data on our other primary outcomes: positive birth experience; maternal pain; chorioamnionitis; neonatal infection; or admission to NICU.

Secondary outcomes

Caesarean birth

The impact of four-hourly vaginal examinations compared with two-hourly vaginal examinations on the incidence of caesarean births was unclear (RR 1.30, 95% CI 0.61 to 2.78; one study, 150 women; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 7.9).

Operative vaginal birth

The impact of four-hourly vaginal examinations compared with two-hourly vaginal examinations on the incidence of operative vaginal births was unclear (RR 0.69, 95% CI 0.32 to 1.52; one study, 150 women; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 7.10).

Length of labour (in hours)

The impact of four-hourly vaginal examinations compared with two-hourly vaginal examinations on length of labour was unclear (MD 0.10, 95% CI −1.28 to 1.48; one study, 109 women; very low certainty, downgraded for very serious risk of bias and very serious imprecision; Analysis 7.11).

Epidural for pain relief

The impact of four-hourly vaginal examinations compared with two-hourly vaginal examinations on the number of women using epidural for pain relief was unclear (RR 1.30, 95% CI 0.65 to 2.60; one study, 109 women; very low certainty evidence, downgraded for very serious risk of bias and very serious imprecision; Analysis 7.12).

The study did not assess any of our other secondary outcomes: physiological labour and birth; narcotics for pain relief; maternal infection; PPH ≥ 1000 mL; PPH ≥ 500 mL; severe perineal/vaginal trauma; urinary incontinence at six weeks postnatal; breastfeeding/mixed feeding up to six weeks postnatal; PND; women's preference for the intervention in future; maternal mortality or severe morbidity; Apgar score < 7 at 5 minutes; neonatal resuscitation; neonatal fitting/seizures; hypoxic ischaemic encephalopathy; perinatal mortality; severe perinatal morbidity.

Subgroup and sensitivity analyses were not possible as no relevant data were available.

Routine vaginal examinations versus vaginal examinations as indicated (Comparisons 9 & 10, one study, 204 women and babies in the analysis)

We included one study that compared routine vaginal examinations to vaginal examinations as indicated (Win 2019). The study was undertaken in Malaysia (an upper-middle-income country), and included primiparous women being induced at term for various indications. In this study 205 women were randomised, and data were analysed for 204 women and their babies. Induction of labour was through oral misoprostol, amniotomy, or oxytocin infusion depending on progress in labour. In the routine four-hourly vaginal examination group, women were assessed for suitability for amniotomy at each vaginal examination, whereas in the vaginal examination as indicated group women were given misoprostol four-hourly and only had a vaginal examination if there was a clinical reason. As a result, women in the routine four-hourly vaginal examination group were more likely to have amniotomy or oxytocin, or both, as part of the induction process. This may have influenced some outcomes including length of labour. Furthermore, following the initial 12-hour study period, all women were cared for according to the standard induction protocol. For risk of bias, see Characteristics of included studies.

There were significant variations in the protocol relating to methods of induction between the two groups, which meant that it was not possible to ascertain whether any differences in outcomes may be due to the different vaginal examination approach being assessed.

Primary outcomes

Augmentation of labour (at the end of 12-hour study period)

Routine vaginal examinations may result in more women having their labour augmented compared with vaginal examinations as indicated (RR 2.55, 95% CI 1.03 to 6.31; one study, 204 women). The certainty of the evidence was low, downgraded for very serious imprecision (Analysis 9.2; Analysis 10.2; Summary of findings 4). The significant variations in the induction protocol discussed above could have had implications for this outcome in particular.

Spontaneous vaginal birth

There may be little or no difference in the number of women having a spontaneous vaginal birth between routine vaginal examinations and vaginal examinations as indicated (RR 1.08, 95% CI 0.73 to 1.59; one study, 204 women). The certainty of the evidence was low, downgraded for very serious imprecision (Analysis 9.3; Analysis 10.3; Summary of findings 4).

Chorioamnionitis

There were insufficient data to assess the impact of routine vaginal examinations compared to vaginal examinations as indicated on chorioamnionitis, as there was only one event (RR 3.06, 95% CI 0.13 to 74.21; one study, 204 women). The certainty of the evidence was low, downgraded for very serious imprecision (Analysis 9.4; Analysis 10.4; Summary of findings 4).

Neonatal infection

Insufficient data precluded any conclusions regarding the impact of routine vaginal examinations compared to vaginal examinations as indicated on neonatal infection, as there were only five events (RR 4.08, 95% CI 0.46 to 35.87; one study, 204 babies). The certainty of the evidence was low, downgraded for very serious imprecision (Analysis 9.5; Analysis 10.5; Summary of findings 4).

Admission to NICU

Insufficient data precluded any conclusions regarding the impact of routine vaginal examinations compared to vaginal examinations as indicated on admission to NICU, as there were only 12 events (RR 2.04, 95% CI 0.63 to 6.56; one study, 204 babies). The certainty of the evidence was low, downgraded for very serious imprecision (Analysis 9.6; Analysis 10.6; Summary of findings 4).

The study did not assess positive birth experience or maternal pain.

Secondary outcomes

Caesarean birth

There may be little or no difference in the incidence of caesarean section between routine four-hourly vaginal examinations and vaginal examinations as indicated (RR 1.19, 95% CI 0.88 to 1.60; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.9).

Operative vaginal birth

There may be little or no difference in the incidence of operative vaginal birth between routine four-hourly vaginal examinations and vaginal examinations as indicated (RR 0.63, 95% CI 0.36 to 1.10; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.10).

Length of labour (in hours)

Routine four-hourly vaginal examinations may reduce length of labour compared with vaginal examinations as indicated (MD −6.80, 95% CI −10.62 to −2.98; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.11). It is unclear if this would be beneficial or harmful to women and their babies, and the significant variations in the induction protocol discussed above could have had implications for this outcome in particular.

Epidural for pain relief

Routine four-hourly vaginal examinations may make little difference to the number of women having epidural for pain relief compared to vaginal examinations as indicated (RR 0.87, 95% CI 0.54 to 1.41; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.12).

Narcotics for pain relief

Routine four-hourly vaginal examinations may make little difference to the number of women having narcotics for pain relief compared to vaginal examinations as indicated (RR 1.15, 95% CI 0.71 to 1.85; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.13).

PPH (≥ 500 mL)

Routine four-hourly vaginal examinations may make little difference to the number of women having a PPH greater than or equal to 500 mL compared to vaginal examinations as indicated (RR 0.92, 95% CI 0.39 to 2.16; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.16).

Women's preferences for the intervention in the future

More women may prefer vaginal examinations as indicated for future labours compared to routine four-hourly vaginal examinations (RR 0.54, 95% CI 0.44 to 0.68; one study, 204 women; low certainty evidence, downgraded for very serious imprecision; Analysis 9.21).

Apgar < 7 at 5 minutes

Insufficient data precluded any conclusions regarding the number of babies with Apgar scores less than 7 at 5 minutes for routine four-hourly vaginal examinations compared to vaginal examinations as indicated, as there were only six events (RR 2.04, 95% CI 0.38 to 10.89; one study, 204 babies; low certainty evidence, downgraded for very serious imprecision; Analysis 9.23).

The study did not assess any of our other secondary outcomes: physiological labour and birth; maternal infection; PPH ≥ 1000 mL; severe perineal/vaginal/anal trauma; urinary incontinence at six weeks postnatal; breastfeeding/mixed feeding up to six weeks postnatal; PND; women's preference for the intervention in future; maternal mortality or severe morbidity; neonatal resuscitation; neonatal fitting/seizures; hypoxic ischaemic encephalopathy; perinatal mortality; severe perinatal morbidity.

Subgroup and sensitivity analyses were not possible as no relevant data were available.

DISCUSSION

Summary of main results

This updated review included four studies that randomised a total of 755 women and reported data on 744 women and their babies. All studies were from high-income (Abukhalil 1996; Murphy 1986), or upper-middle-income countries (Seval 2016; Win 2019). All studies were at high risk of performance bias due to the nature of the interventions. We assessed two studies as at low risk of selection bias (Seval 2016; Win 2019), and the other two studies as at unclear risk of bias (Abukhalil 1996; Murphy 1986). We assessed two studies as at high risk of reporting bias (Abukhalil 1996; Murphy 1986). Of these two studies, Murphy 1986 was also assessed as at high risk

of detection bias, and Abukhalil 1996 was also assessed as at high risk of attrition bias. We assessed the other two studies as at low or unclear risk of bias for other domains. The overall certainty of the evidence assessed using GRADE was low or very low; studies were generally downgraded due to risk of bias or imprecision, or both.

We were unable to evaluate the effectiveness of routine vaginal examinations compared to other methods in assessing labour progress due to a lack of outcome data, or lack of certainty of the evidence. None of the included studies assessed positive birth experience.

Routine vaginal examinations compared to routine ultrasound to assess labour progress

We included one study that compared routine vaginal examinations to routine ultrasound for the assessment of labour progress (Seval 2016). This small trial was carried out in a tertiary facility in Turkey. The study randomised 90 multiparous women in spontaneous labour and reported data on 83 women and babies.

Our results suggest that routine vaginal examinations may result in a slight increase in pain compared with routine ultrasound assessments of labour progress. However, the certainty of the evidence is low, and it is unclear from the information provided what the pain that has been assessed may relate to. No data were reported on our other primary outcomes of positive birth experience, augmentation of labour, spontaneous vaginal birth, chorioamnionitis, neonatal infection, or admission to NICU. Furthermore, routine vaginal examinations and routine ultrasound assessments were carried out at a frequency of two- to four-hourly in the latent phase, and one- to two-hourly in the active phase. This is more frequent than the standard protocol for some settings, and more than is recommended by international guidance (WHO 2018; WHO 2020).

Intrapartum ultrasound is increasingly suggested as a method to assess labour progress (Hassan 2014; Mohan 2019; Tang 2021; Usman 2018a), and to predict labour outcomes, such as time of birth and mode of birth (Carvalho Neto 2019; Chan 2021; Dall'Asta 2019; Erlick 2020). We did not find any evidence from RCTs that would enable an assessment of the effectiveness of this method to improve outcomes for mothers and babies. We believe that it is timely and necessary to understand how effective and acceptable ultrasound is as a method to assess labour progress in terms of identifying where progress is physiological and distinguishing indicators of pathology. It has been suggested that ultrasound to assess labour progress may be useful in low-income settings (Wiafe 2021). This is of concern given the resource implications of ultrasound versus vaginal examination or observation of other physical signs and/or maternal behavioural cues. The expense of buying and maintaining the equipment is relevant, as is the cost of training and sustaining the skilled practice of practitioners in resource-poor settings. If these costs are not met, there is a risk (which is also relevant to other settings) of the use of ultrasound to assess labour progress by providers who are not adequately trained, with the potential for misdiagnosis and consequent iatrogenic intervention, or misreading important signs of pathology.

Routine vaginal examinations versus routine rectal examinations to assess labour progress

We included one study that compared routine vaginal examinations to routine rectal examinations to assess labour progress (Murphy 1986). In this study, 310 women of mixed parity were randomised, and data were reported on 307 of these women and their babies. This study was carried out in a tertiary facility in Ireland where, according to the authors, routine rectal examinations were the standard method of assessing labour progress at the time.

It is unclear from our results whether there is any difference in the effect of routine vaginal examinations versus routine rectal examinations on augmentation of labour, as the data are compatible with a wide range of effects including both substantial benefit and substantial harm. This is also the case for spontaneous vaginal birth, neonatal infections, and admission to NICU, for which the certainty of the evidence was assessed as very low. There was little or no difference between groups for other review outcomes assessed by this study; however, the evidence was very uncertain due to insufficient data. The study did not report on positive birth experience, chorioamnionitis, or maternal pain.

At the time of publication of this study (Murphy 1986), the authors stated that two of the large maternity hospitals in Ireland still used rectal examinations as standard practice for reasons that were unclear. Although there is more recent mention of the use of routine rectal examinations in China, in a report from 2008 (Gao 2008), it is unclear whether rectal examinations are currently used in any maternity settings to assess labour progress. We did not find any RCT evidence that allowed us to evaluate the effectiveness of this method to assess labour progress.

Routine four-hourly examinations versus routine two-hourly examinations to assess labour progress

We included one study that compared four-hourly routine vaginal examinations to two-hourly routine vaginal examinations (Abukhalil 1996). This study was carried out at a maternity unit in England. Whilst 150 primiparous women were randomised, some outcomes were reported following significant attrition after randomisation at 32 weeks, with the result that we have data for only 109 women and babies for these outcomes.

We are uncertain about any effect of the frequency of routine vaginal examinations on augmentation of labour or spontaneous vaginal births, as the data were compatible with both benefit and harm. The study did not report on positive birth experience, chorioamnionitis, neonatal infection, admission to NICU, or maternal pain.

The aim of this study was to assess whether two-hourly vaginal examinations, rather than the standard practice of four-hourly vaginal examinations, influences the length of labour, with the rationale that more frequent assessments would facilitate the identification of women "who are at risk of prolonged labour and who may benefit from early and timely intervention" (Abukhalil 1996). Progress was deemed to be unsatisfactory if cervical dilation was not measured to increase by one centimetre per hour. However, the authors concluded that there was no difference in the length of labour between the two groups, and that there was therefore no added value in advocating for this approach as a method to reduce the length of labour.

The main outcome of interest in this study was length of labour, rather than outcomes relevant to maternal or fetal well-being. As discussed above, recent evidence shows that duration of labour alone should not be used to identify women at risk of adverse birth outcomes, and that in the absence of signs of problems, women should be offered supportive, individualised care (Abalos 2018; Bonet 2019; Lundborg 2020; Oladapo 2018a; Souza 2018).

Routine vaginal examinations compared to vaginal examinations as indicated to assess labour progress

We included one study that compared routine vaginal examinations (four-hourly) to vaginal examinations as indicated for a study period of 12 hours in women having induction of labour (Win 2019). After this 12-hour period, all participants were cared for according to the standard induction protocol for the unit. This study was carried out in Malaysia; 205 primiparous women undergoing induction of labour at term for different indications were randomised, with data reported on 204 women and babies. The method used for induction of labour was oral misoprostol, followed by amniotomy or oxytocin, or both, depending on labour progress.

We found that routine vaginal examination may result in more women having augmentation of labour, and that there may be no difference between groups in spontaneous vaginal births, although the certainty of the evidence was low. There were insufficient data to permit an assessment of chorioamnionitis, neonatal infection, or admission to NICU. The study did not report on positive birth experience or maternal pain. There were important (and some unclear) differences in the induction protocol between the two groups, which may have influenced these outcomes. Women in the four-hourly group were more likely to have amniotomy or oxytocin infusion, or both, during the 12-hour study period as indicated by the findings of the vaginal examination.

The authors concluded that women consistently prefer vaginal examinations as indicated to scheduled four-hourly examinations, "despite a shorter interval to vaginal birth" in this latter group (Win 2019). It should be noted that fast labours can also result in negative experiences for women, and that the short- or long-term effects on women and babies of shortening the length of labour are unknown. There may be hormonal or epigenetic implications, or both, for the immediate intrapartum period and the transition during birth, or longer-term consequences of hormonally induced epigenetic changes (Dahlen 2013; Dahlen 2016).

Routine vaginal examinations versus other physical and behavioural cues to assess labour progress

We did not find any studies that compared routine vaginal examinations to any of the other physical (e.g. purple line) or behavioural cues (e.g. vocalisations, changes in mood or breathing patterns) that can be used to assess labour progress.

Overall completeness and applicability of evidence

A major limitation of this review is that we identified only four eligible studies. The studies were small, including data for 83 (Seval 2016), 307 (Murphy 1986), 150 (Abukhalil 1996), and 204 women and their babies (Win 2019). Two studies, Abukhalil 1996; Murphy 1986, were the only studies included in the previous version of this review (Downe 2013), which concluded that vaginal examinations may be preferred over rectal examinations, but that for all other outcomes there was insufficient evidence to support or reject the use of routine vaginal examinations to monitor labour progress. We were only able to include two additional studies in the current version of the review (Seval 2016; Win 2019). Data were lacking for many of our outcomes, and none of the outcomes could be pooled in meta-analysis. The evidence for most of the outcomes assessed in the review is still uncertain. We could only conclude that women may find routine vaginal examinations more comfortable than routine rectal examinations; that routine ultrasound may be less painful than routine vaginal examinations; and that women may prefer vaginal examinations as indicated to assess labour progress; however, the certainty of the evidence is low. We do not yet know which method of assessing labour progress is most effective at improving outcomes or experiences for women and babies, or if current standard methods are effective at improving outcomes or experiences for women and babies at term.

None of the included studies set out to determine which method of assessment is more effective in improving outcomes or reducing morbidity and mortality for women or babies. The included studies aimed to determine women's 'reactions' to routine vaginal examinations compared to the (then) standard practice of routine rectal examinations in that setting (Murphy 1986); whether routine two-hourly compared to routine four-hourly vaginal examinations could reduce the duration of labour (Abukhalil 1996); if routine vaginal examinations were associated with increased pain and anxiety compared to routine ultrasound assessment of progress (Seval 2016); and whether routine vaginal examinations compared to vaginal examinations as indicated influenced length of labour or satisfaction with birth (Win 2019). None of the included studies undertook a holistic assessment of birth experience that would fulfil the definition of a positive birth experience as defined by the WHO (WHO 2018). We also did not find any eligible studies that compared routine vaginal examinations to the other physical and behavioural cues that can be used to assess labour progress. These represent important areas for future research.

Quality of the evidence

The four included studies had several limitations that may be considered to affect their quality (Figure 3). The two older studies included little methodological information according to current standards (Abukhalil 1996; Murphy 1986). Regarding the study that assessed the use of routine vaginal examinations compared to routine ultrasound (Seval 2016), it was difficult to determine what aspect of labour and birth the pain that was being assessed was in relation to. The aim of the most recent study appears to be to compare women's satisfaction, and induction-to-birth interval, with two different induction protocols (Win 2019), although this is not clearly described in the paper. The study compared routine four-hourly vaginal examinations with vaginal examinations as indicated, but the four-hourly vaginal examination group also received amniotomy then oxytocin infusion according to the findings of the vaginal examination. It is unclear to what extent this occurred in the vaginal examination as indicated group. Furthermore, after an initial 12-hour period, the standard labour induction protocol was used in both groups.

The included studies were at low or unclear risk of selection bias. All of the included studies were high risk for performance bias. Two studies were at high risk of reporting bias (Abukhalil 1996; Murphy 1986); one of these studies was also at high risk of detection bias (Murphy 1986), and the other was at high risk of attrition bias

(Abukhalil 1996). All of our other risk of bias assessments were low or unclear.

We used the GRADE approach to assess the certainty of the evidence for both our primary and secondary outcomes, but reported summary of findings tables for our seven primary outcomes (see Summary of findings 1; Summary of findings 2; Summary of findings 3; Summary of findings 4). The certainty of the evidence for these seven primary outcomes was low or very low, downgraded mainly for risk of bias or imprecision.

Potential biases in the review process

In order to reduce the risk of bias in the review process, we carried out a comprehensive literature search without any restrictions with regard to language or publication date. We also used independent assessments where possible, for example in screening studies for inclusion and undertaking data extraction. However, we acknowledge that there are several sources of potential bias, including that GRADE and risk of bias assessments involve subjective judgements.

Agreements and disagreements with other studies or reviews

Routine vaginal examinations are an intrinsic element in the use of the partograph. The Cochrane Review on the use of the partograph concludes that "... on the basis of the findings of this review, we cannot recommend routine use of the partograph as part of standard labour management and care" (Lavender 2018). Data from this review further suggest that there is as yet no good-quality evidence available to determine best practice in terms of the frequency of vaginal examination, or of its use as a routine assessment of either physiological labour progress or of incipient or actual labour dystocia. We therefore conclude that there is no evidence to support or to reject routine vaginal examination as a part of standard labour management and care, or, in agreement with Lavender and colleagues (Lavender 2018), as an intrinsic element of the partograph.

Qualitative studies of women's views of vaginal examination indicate variation from positive appreciation of the technique as a way of knowing how their labour is progressing (Dixon 2013b; Lewin 2005), to the perception that it is a necessary part of labour, even though it might cause pain and embarrassment (Lai 2002), to disempowering and traumatising experiences (Hassan 2012; Reed 2017; Teskereci 2020). There do not appear to be any qualitative studies of women's views of the use of the other methods that can be used to assess labour progress, including the use of ultrasound and monitoring of the purple line or other physical and behavioural cues. This review is, however, in agreement with other quantitative studies that assess pain or discomfort caused by ultrasound compared to vaginal examinations, or 'compliance' with ultrasound versus vaginal examination (Chan 2015; Iliescu 2015; Mohan 2019; Rizzo 2019; Solaiman 2020; Usman 2018b; Wiafe 2020). These studies generally find that women prefer intrapartum ultrasound over the use of vaginal examinations. However, some of these papers use terms such as 'compliance' with and 'tolerance' to, in relation to the respective intervention. It is perhaps time to move beyond what women will comply with and tolerate in labour and birth to finding out what really matters to women in terms of how their labour is progressing and whether the methods used reflect this.

The WHO has stipulated that a positive birth experience should be at the forefront of care at all times during labour and birth (Oladapo 2018b). We did not find any studies with outcomes that would enable an assessment of positive birth experience, such as sense of achievement and control, continuity of care, or respectful maternity care (Downe 2018; Oladapo 2018b). If research is to meet the needs of policy drivers for maternity care, outcomes that contribute to a positive birth experience should be incorporated into future studies.

AUTHORS' CONCLUSIONS

Implications for practice

We do not yet know which method is most effective or acceptable to women for assessing labour progress, or if any of the methods used to assess labour progress improve outcomes or experiences for women and babies. This is particularly relevant for routine vaginal examinations, as the standard and well-established/embedded approach to assess labour progress, as well as routine ultrasound, which is increasingly suggested as an alternative approach to assess labour progress. There is no evidence from randomised controlled trials (RCTs) to guide the use of other physical and behavioural cues to assess labour progress, which are currently more often used in out-of-hospital settings.

Based on the findings of this review, we cannot be certain which method is most effective or acceptable to women for assessing labour progress, as there were insufficient data available, and no synthesis of data has been possible.

Implications for research

There is global concern about excessive maternal and fetal mortality and morbidity due to prolonged and obstructed labour (Goldenberg 2018; Harrison 2015), the adverse consequences for mother and infant of overdiagnosis and treatment of prolonged labour (Karaçam 2014; Neal 2015), as well as the impact of overtreatment in general in maternity care (Dahlen 2021; Seijmonsbergen-Schermers 2020). Recognition of the importance of a positive birth experience is now an intrinsic component of World Health Organization (WHO) intrapartum guidelines (Downe 2018; WHO 2018; WHO 2020). This approach is based on the principle that women can be supported to achieve their desired physical, emotional, and psychological outcomes, through the provision of effective practices and avoidance of ineffective and potentially harmful practices during labour and birth (Oladapo 2018b; WHO 2020). Consequently, research is needed to establish effective and acceptable methods to assess labour progress that distinguish between normal variations of labour progress and signs of emerging, potential, or developing pathology, and that contribute to a positive birth experience. In order to achieve this, clear indicators of normal progress, as well as those of potential or developing pathological progress, must be identified so that optimal assessment approaches can be devised. Any method that is used to assess labour progress must be based on women's preferences and needs, as well as feasibility according to the context in which the approach is intended to be used.

We were only able to include four small trials in this review, which presents a significant absence of research in an area that is of major relevance to the many thousands of women giving birth every day. Further large-scale trials are needed to establish the effectiveness

of labour progress assessment methods, including routine vaginal examination versus vaginal examination as indicated, and trials that assess the use of ultrasound and physical/behavioural cues, in order to provide RCT evidence that can guide practice. This may be setting or context dependent, or both, and studies from countries of all incomes are required to make this assessment. Maternal birth experience outcomes should be integral to these trials so that labour progress assessments are based on women's preferences as well as evidence of effectiveness. There is a need for consensus around essential clinical outcomes for inclusion in future trials so that these can be effectively synthesised and compared. The outcomes identified for inclusion in this review may usefully inform such developments, as well as the design of future trials.

The WHO has based its intrapartum guidance on principles and practices that are intended to ensure that birth is safe as well as a positive experience. However, there is currently no tool or approach making a holistic assessment that would enable the evaluation of this outcome within trials. This is an important area for future research to align with WHO priorities for a positive birth experience (WHO 2018). It is anticipated that some aspects of a positive birth experience would be more effectively captured within qualitative research.

The previous version of this Cochrane Review concluded that it was critical for researchers to establish an effective means of assessing labour progress based on physiological and behavioural principles (Downe 2013). This conclusion has not changed. We recommend a mixed-methods approach that begins with a systematic review of the full range of the normal physiology of labour, and of important behavioural cues. An evidence synthesis relating to all methods to assess labour progress, and the collection of qualitative data that incorporate the views and experiences of women, healthcare providers, funders, and policymakers could form the basis of a future definitive cluster-RCT in this area that includes high-quality qualitative and survey data to assess well-being and birth experience. Ideally, any method to assess labour progress would reflect women's experiences of their progress through labour and birth, so that these experiences become central to the knowledge and assessment of labour progress, rather than requiring women's experiences to comply with objective markers of progress that do not reflect the inherent complexities of labour and birth.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Abukhalil 1996

Study characteristics	
Methods	RCT: parallel-group; individual women randomised.
Participants	Inclusion criteria • Nulliparous women in labour with singleton pregnancy. • Women were recruited at 32 weeks if they had no fetal or maternal indicators precluding vaginal birth. Women were subsequently withdrawn if any of the exclusion criteria arose. • 150 women were randomised and analysed fro mode of birth, but 41 were withdrawn due to development of exclusion criteria, leaving 109 women for whom other data were collected. Exclusion criteria • Multiple pregnancy reported as an exclusion criterion. Table 1 reports withdrawals for: PET/PIH; IUGR; labour < 37 weeks; breech; PROM; post-42 weeks; and placenta praevia.
Interventions	Intervention: routine vaginal examinations every 4 hours. • Progress of labour reported on partograph. • Vaginal examinations could be carried out at other times as indicated, e.g. prior to epidural or pethidine; if full dilation was suspected; application of fetal scalp electrode; or fetal blood sampling. • Total number randomised: n = 75 women. • Then 21 (28%) withdrawals for PET/PIH IUGR; preterm labour; breech; post-term; placenta praevia. • Data were reported on 54 women and infants, except mode of birth, for which data were available for all women who had been randomised. Comparator: vaginal examinations every 2 hours. • Progress of labour reported on partograph.

Abukhalil 1996 *(Continued)*

- Vaginal examinations could be carried out at other times as indicated, e.g. prior to epidural or pethidine; if full dilation was suspected; application of fetal scalp electrode; or fetal blood sampling.
- Total number randomised: n = 75 women.
- Then 20 (27%) withdrawals for PET/PIH IUGR; preterm labour; breech; post-term; placenta praevia.
- Data were reported on 55 women and infants, except mode of birth, for which data were available for all women who were randomised.

Outcomes	Prespecified outcomes (in methods) • Length of labour Reported outcomes • Oxytocin • Epidural • Length of labour • Mode of birth • Number of vaginal examinations • Interval between vaginal examinations • Number of vaginal examinations • Birth weight
Notes	Setting: not specifically stated, but authors from North Staffordshire Maternity Unit, UK with 6000 births/year Study dates: May 1992 to April 1993 Funding sources: not reported Declarations of interest: not reported Ethics approval: from District Ethical Committee Prospective registration: not reported; however, publication is pre-2010 Comparisons: 7 & 8, routine 4-hourly vaginal examinations vs routine 2-hourly vaginal examinations Subgroups • **Primiparous**/multiparous/mixed or not reported • **HIC**/LMIC/mixed or not reported Additional information • ARM not mandatory as long as progress at 1 cm/h. If progress not satisfactory, then ARM or oxytocin. • Women encouraged to be ambulant in 1st stage, and routine CTG not considered essential unless obstetrician indicated. • We are still attempting to contact the authors to ask about their randomisation process, to see if they have more information on the incidence and treatment of infection, and to ask if they have data on other outcomes.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "... computer derived using random number allocation ..."
Allocation concealment (selection bias)	Unclear risk	Quote: "... group allocated stated on case notes ..."; no information to suggest allocation concealment.

Abukhalil 1996 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	No information provided; however, it was not possible to blind women or personnel.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No report of any attempt to blind assessors.
Incomplete outcome data (attrition bias) All outcomes	High risk	150 women were randomised, then 27% of women in the 2-hourly arm and 28% of women in the 4-hourly arm were withdrawn because they developed exclusion criteria after randomisation.
Selective reporting (reporting bias)	High risk	Only "length of labour" was reported as an outcome in methods; however, other outcomes were reported in results (e.g. onset of labour, mode of birth). We did not assess the trial protocol.
Other bias	Unclear risk	There is insufficient reporting of methods, therefore it is unclear if there might be other biases.

Murphy 1986

Study characteristics	
Methods	RCT: parallel-group; individual women randomised.
Participants	Inclusion criteria • Women in labour at term with recent rupture of membranes. • Total number randomised: n = 310. 3 were incorrectly labelled, therefore data for 307 women were analysed. 303 women returned questionnaires (4 women were not provided with a questionnaire due to stillbirth, neonatal loss, woman discharged prior to issue, baby diagnosed with Edward's syndrome). Exclusion criteria • None specified.
Interventions	Intervention: routine vaginal examinations (every 2 hours). • Vaginal examination to assess progress in labour. • Women examined on entry, 1 hour later, then every 2 hours unless more frequent examinations were prompted by slow progress in labour. • Woman in dorsal position. • Hands scrubbed and sterile surgical gloves worn. • Drapes and antiseptics solutions not employed, and chlorhexidine (Hibitane) cream used as lubricant. • Total number of women randomised to vaginal examinations: n = 154. Comparator: routine rectal examinations (every 2 hours). • Rectal examination to assess progress in labour. • Rectal examinations carried out using the standard approach for the setting at the time, i.e. disposable polythene glove. • Drapes and antiseptics solutions not employed, and chlorhexidine (Hibitane) cream used as lubricant. • Total number of women randomised to rectal examinations: n = 153.

Murphy 1986 *(Continued)*

Outcomes	Prespecified outcomes (from methods) • Self-administered semi-structured questionnaire asking questions on a variety of aspects of labour including pain and discomfort • Infection Reported outcomes • Self-administered semi-structured questionnaire. Reported on levels of discomfort (non-prespecified outcome) • Mode of birth • Oxytocin in labour • Apgar score < 7 at 1 minute • Admission to NICU • Number of pelvic examinations • Infections
Notes	Setting: National Maternity Hospital Dublin from February to April 1984 Study dates: February to April 1984 Funding sources: not reported Declarations of interest: not reported Ethics approval: not reported Prospective registration: not reported, but publication pre-2010 Comparisons: 5 & 6, routine vaginal examinations vs routine rectal examinations Subgroups • Primiparous/multiparous/**mixed** or not reported • **HIC**/LMIC/mixed or not reported Additional information • Study reported on women's discomfort, reporting not uncomfortable: vaginal examination 48/151 vs rectal examination 18/152. • Study reported Apgar score at < 7 at 1 minute: vaginal examination 12/154 vs rectal examination 9/153. • Of the 2 perinatal mortalities, 1 was a stillbirth in the rectal examination group, and the other a neonatal death in the vaginal examination group.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "… randomly allocated …" but no information provided on sequence generation.
Allocation concealment (selection bias)	Low risk	Quote: "... serially numbered, sealed, opaque envelopes ..."
Blinding of participants and personnel (performance bias) All outcomes	High risk	It was not possible to blind participants or personnel.

Murphy 1986 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	High risk	Women's comfort was assessed by self-administered questionnaires, and women could not be blinded. Similarly, clinicians made the decisions on augmentation, CS, and OVB, and there was no information stating they were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Of 310 women, 3 were "incorrectly labelled". Also, 4 women missed the questionnaires (1 in rectal group and 3 in vaginal group) but still had clinical outcomes assessed.
Selective reporting (reporting bias)	High risk	There were a number of outcomes in the results that were not specified in the methods (e.g. oxytocin augmentation; Apgar scores; admission to NICU). We did not assess the trial protocol.
Other bias	Unclear risk	There was very little methodological information reported, therefore it is unclear if there may be other biases.

Seval 2016

Study characteristics	
Methods	RCT: parallel-group; individual women randomised; 1:1 randomisation
Participants	Inclusion criteria • Multiparous women with spontaneous onset of labour and a fetus in cephalic presentation. • Number of women randomised and number analysed: 90 women randomised and 83 analysed; 7 exclusions, 1 because the intervention was discontinued (US group), and 6 gave birth by CS (4 in VE group and 2 in US group). Exclusion criteria • Women in advanced labour (dilation > 7 cm); need for induction of labour; CS; prenatal diagnosis fetal anomaly; women with known or suspected psychiatric condition. • Admission to NICU after birth or prolonged hospital stay due to excessive weight loss or jaundice of neonate. (These are assessed after randomisation so may introduce post-randomisation bias.)
Interventions	Intervention: routine vaginal examination (2- to 4-hourly). • Every 2 to 4 hours in the latent phase, and every 1 to 2 hours in the active phase of labour. • Performed between contractions, whilst the woman was resting. • Women giving birth were supported by same team of researchers. • Total number randomised: n = 45. Number analysed: n = 41 (4 post-randomisation exclusions for giving birth by CS). Comparator: routine transperineal ultrasound (2- to 4-hourly). • Every 2 to 4 hours in the latent phase, and every 1 to 2 hours in the active phase of labour. • Performed between contractions, whilst the woman was resting. • Using a Voluson E6 Ultrasound system (GE Medical Systems, Zipf, Austria) with a convex probe covered with a disposable glove. • Measured in the anteroposterior plane (as described by Hassan 2013). • Fetal head descent evaluated with transperineal US (as described by Barbera 2009). • Women giving birth were supported by same team of researchers. • Total number randomised: n = 45. Number analysed: n = 42 (3 post-randomisation exclusions: 1 discontinued intervention, and 2 gave birth by CS).

Seval 2016 *(Continued)*

Outcomes	Prespecified outcomes • Pain level with VAS – latent phase • Pain level with VAS – active phase (> 6 cm) • Pain level with VAS – 12 hours postpartum • Acute anxiety assessed by STAI-1 scores – latent phase • Acute anxiety by STAI-1 – active phase (> 6 cm) • Acute anxiety by STAI-1 – 12 hours postpartum • General anxiety assessed by STAI-2 scores – latent phase • General anxiety by STAI-2 – active phase (> 6 cm) • General anxiety by STAI-2 – 12 hours postpartum Reported outcomes • Pain level with VAS – latent phase • Pain level with VAS – active phase (> 6 cm) • Pain level with VAS – postpartum • Acute anxiety assessed by STAI-1 scores – latent phase • Acute anxiety by STAI-1 – active phase (> 6 cm) • Acute anxiety by STAI-1 – postpartum VAS: 0 = worst pain imaginable and 10 = no pain STAI: range 20 to 80, with higher scores reflecting more anxiety
Notes	Setting: Department of Obstetrics & Gynaecology, Ankara University, a tertiary care facility in Turkey Study dates: November 2015 to March 2016 Funding sources: not reported Declarations of interest: not reported Ethics approval: from Ankara University Ethics Committee Prospective registration: NCT02599610 Comparisons: 1 & 2, routine VE vs routine US Subgroups • Primiparous/**multiparous**/mixed or not reported • HIC/**LMIC**/mixed or not reported Additional information • STAI and SCL-90-R questionnaires translated into Turkish were used, and validation of the translated questionnaires was performed. • We reported on the assessments at 12 hours after birth for maternal pain and anxiety, although the study also reports measurements during the latent and then active phases of labour.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence generated by a computer algorithm.
Allocation concealment (selection bias)	Low risk	Quote: "Women…were given a sealed opaque envelope containing their allocated group. Randomization 1:1 to each group was achieved by numbering the

Seval 2016 *(Continued)*

		envelopes from 1 to 90, with their order of sequence generated by a computer algorithm."
Blinding of participants and personnel (performance bias) All outcomes	High risk	VE and US were performed by 1 member of the same team of researchers, so not blinded for clinicians; however, it is unclear whether women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Allocation was kept unknown to the outcome assessor (B.D) until the end of the study.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Although 3 women were excluded after randomisation from the TPUS group and 4 from the DVE group, this amounts to 8%.
Selective reporting (reporting bias)	Unclear risk	It is unclear whether the STAI-2 assessments were to be assessed during the latent, active, and 12 hours postnatal phases, as these were not reported in the results. Also, we did not assess the trial protocol.
Other bias	Unclear risk	Baseline characteristics (maternal age, level of education, admission scores for VAS and STAI) were similar between groups; however, there is insufficient methodology reported to draw conclusions regarding other possible biases.

Win 2019

Study characteristics	
Methods	RCT: parallel-group; individual women randomised 1:1; open-label with blocks of 4 or 8.
Participants	Inclusion criteria • Nulliparous, singleton fetus, > 37 weeks gestation, cephalic presentation, reassuring heart rate. • Number of women randomised and number analysed: 205 randomised and 204 analysed (1 woman not given oral misoprostol as had emergency CS). Exclusion criteria • Women having regular contractions (2 in 10 minutes); ruptured membranes; previous uterine surgery (e.g. myomectomy or hysterotomy); known prostaglandin allergy; contraindication to vaginal birth.
Interventions	Intervention: routine vaginal examination 4-hourly. • Women had a vaginal examination prior to the first dose of oral misoprostol. • Amniotomy can be performed at the initial vaginal examination if the cervix is found to be favourable (cervical dilatation of at least 2 to 3 cm and station of not higher than 2 cm above the ischial spine), in which case oral misoprostol would not be given. • After an amniotomy, no further prostaglandin was used for induction, and titrated oxytocin infusion may be started as deemed appropriate by the care providers. • Total number randomised: n = 101; number analysed: n = 101. Comparator: vaginal examination as indicated. • Women in the restricted arm had their first oral misoprostol dose without a vaginal examination. • Vaginal examination was avoided, and oral misoprostol administered 4-hourly if there was no clinical indication to withhold the dose.

Win 2019 *(Continued)*

- At 12 hours after the start of the oral misoprostol induction regimen (the primary study period), a vaginal examination was performed if the woman had not already given birth, and standard labor induction and delivery care were provided to all women.
- Total number randomised: n = 104; number analysed: 103 (1 woman was excluded as she did not have misoprostol).

Care in both arms of the study

- Standard induction procedure: 50 ug oral misoprostol given every 4 hours to a maximum of 3 doses in first 24 hours; routine labour induction typically commenced at 8 a.m.; fetal heart tracing monitoring was performed for half an hour before each dose and 1 hour after; misoprostol dose was withheld if woman was distressed or hypertonus; after amniotomy no further misoprostol was administered, and titrated oxytocin infusion started if deemed appropriate.
- Unscheduled vaginal examination was performed in either trial arm if a clinical indication arose (e.g. membrane rupture, excessive bleeding, suspected uterine overstimulation, maternal and/or fetal concerns, suspected second stage of labour, or suspected established labour with request for strong analgesia).

Outcomes

Prespecified outcomes

Primary

- Women's satisfaction with the birth process, evaluated by VNRS as soon as possible after birth
- Induction to vaginal birth interval (measured using recorded start of induction to recorded time of vaginal birth in women's medical records)
- Vaginal birth in 24 hours (derived from dichotomisation of induction to vaginal birth data)

Secondary

- Women's satisfaction with the induction process evaluated by VNRS at the 12-hour study period
- Women's preference on the vaginal assessment regimen in a future labour induction (measured using Likert scale responses to a statement at 12 hours and before discharge from hospitalisation for birth)
- Total numbers of vaginal examination in first 12 hours of labour induction
- Total oral misoprostol doses used during birth process
- Other modes (other prostaglandins, route, balloon) used for labour induction
- Oxytocin use in labour
- Epidural in labour
- Mode of delivery
- Delivery blood loss
- Apgar score at 5 minutes
- Admission to neonatal ward
- Cord blood pH and base excess
- Induction to hospital discharge interval (maternal)

Reported outcomes

- All primary outcomes the same as the trial protocol
- *Additional secondary outcomes such as uterine hyperstimulation, opioids added*

For satisfaction: VNRS: an 11-point visual numerical rating score, self-marked by women with scores from 0 to 10; higher scores indicate greater satisfaction.

Likert scale questionnaire for preferences

Notes

Setting: the study was conducted in University Malaya Medical Centre

Study dates: November 2016 to September 2017

Funding sources: not reported

Win 2019 *(Continued)*

Declarations of interest: study authors declared no conflicts of interest

Ethics approval: the trial was approved by the Medical Ethics Committee of University Malaya Medical Centre (date of approval: 20 September 2016; reference number: 2016728-4061)

Prospective registration: registered in the ISRCTN registry (ISRCTN68476694) prior to enrolment of trial participants

Comparisons: 9 & 10

Subgroups

- **Primiparous**/multiparous/mixed or not reported
- HIC/**LMIC**/mixed or not reported

Additional information

- The study reports women's satisfaction (VNRS) with the birth process as median and interquartile range, reporting 7 (6 to 9) for 101 women in the routine VEs group versus 8 (6 to 10) for 103 women in the VEs as indicated group, P = 0.15.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: “Envelopes were prepared based on a computer-generated (using random.org) random sequence”
Allocation concealment (selection bias)	Low risk	Quote: “... opening of the lowest-numbered sealed and opaque envelope available”
Blinding of participants and personnel (performance bias) All outcomes	High risk	Open-label, not able to blind participants and personnel.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not reported.
Incomplete outcome data (attrition bias) All outcomes	Low risk	1/205 (0.5%) exclusion after randomisation.
Selective reporting (reporting bias)	Unclear risk	Opiate analgesia in labour and uterine hyperstimulation were reported on but were not prespecified in the trial registration or methods section of the publication. Also, we did not assess the trial protocol, and in view of the large number of outcomes that were prespecified and reported on, we assessed this study as at unclear risk of reporting bias.
Other bias	Unclear risk	Methodological information is lacking, therefore it is unclear whether there were other biases.

ARM: artificial rupture of membranes
CS: caesarean section
CTG: cardiotocography
DVE: digital vaginal examination
HIC: high-income country
IUGR: intrauterine growth restriction
LIC: low-income country

MIC: middle-income country
NICU: neonatal intensive care unit
OVB: operative vaginal birth
PET: pre-eclamptic toxaemia
PIH: pregnancy-induced hypertension
PROM: pre-labour rupture of membranes
RCT: randomised controlled trial
RE: rectal examination
SCL-90-R: Symptom Checklist-90-Revised
STAI: State-Trait Anxiety Inventory
TPUS: transperineal ultrasound
US: ultrasound examination
VAS: visual analogue scale
VE: vaginal examination
VNRS: Visual Numerical Rating Score

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Barros 2021	Study compared transabdominal US and transperineal US versus no intervention to aid operative vaginal birth, not to assess progress of labour. Women were recruited at full dilatation.
Chanrachakul 2001	Study compared use of "sweeping membranes alongside VEs" versus "no sweeping membranes and VEs alone" to speed up labour.
Dupuis 2005	Study compared the kind of practitioners who undertook VEs, and assessed whether a senior resident was more accurate at assessing position of baby's head than the attending physician. The study did not address progress of labour, as all women had a fully dilatated cervical os when the examination was undertaken.
Foong 2000	Study was a trial of membrane sweeping for induction of labour.
Fuentes 1995	Study compared 2 different types of gel used to reduce infection when VEs are undertaken.
Martin 2021	Study compared the interrater reliability between DilaCheck and standard VE, not how these assessments impact on labour and birth progress and outcomes.
Peterson 1965	Study was a quasi-RCT (using alternate allocation) comparing VE with rectal examinations (RE) on the differing organisms found in the vagina at and after birth. As well as allocating women to VE and RE on an alternate basis, the authors added women from the initial work in this study where there was no control group, hence the groups were not randomised or quasi-randomised, resulting in a major imbalance in the number of women in the 2 groups. 833 women were assessed by vaginal examination, and 653 women were assessed by rectal examination. The study did not report on any of our review outcomes.
Popowski 2015	Study compared VE versus VE + US to assess the position of the fetal head (with classification as left, right, or direct occiput anterior), and attempts at manual rotation were at the discretion of the healthcare professional managing the birth. Women were entered into the trial when the cervix was assessed as ≥ 8 cm dilatation, therefore the interventions were not used to assess progress of labour.
Yaddehige 2015	Study addressed membrane sweeping and cervical massage, not VEs to assess progress of labour.

RCT: randomised controlled trial
US: ultrasound
VE: vaginal examination

Characteristics of ongoing studies *[ordered by study ID]*

Oberman 2020

Study name	Assessment of labour progress by intrapartum ultrasound
Methods	Randomised controlled trial with parallel assignment
Participants	Inclusion criteria • Primigravida • Gestational age ≥ 37 weeks (according to 1st trimester sonography) • Single fetus • Cephalic presentation Exclusion criteria • Other known active infection (such as upper respiratory tract infection, urinary tract infection) • Women taking immunosuppressive therapy • Women who arrived in active labour and delivered before being assessed by a physician • Women with contraindications for vaginal birth
Interventions	Intervention: transperineal ultrasound • Briefly, transperineal ultrasound images are obtained by placing a covered transducer between the labia below the symphysis pubis. Comparator: labour progress assessed according to the regular protocol
Outcomes	Primary outcomes • Fever and infection • Number of digital exams
Starting date	27 August 2019 Study completed 5 September 2020.
Contact information	Maya Oberman, MD, Kaplan Medical Center, Rehovot, Israel, 123456
Notes	Study has a published conference abstract; data will be included in the review when there is a full publication.

DATA AND ANALYSES

Comparison 1. Routine vaginal examination versus ultrasound (subgroup by parity)

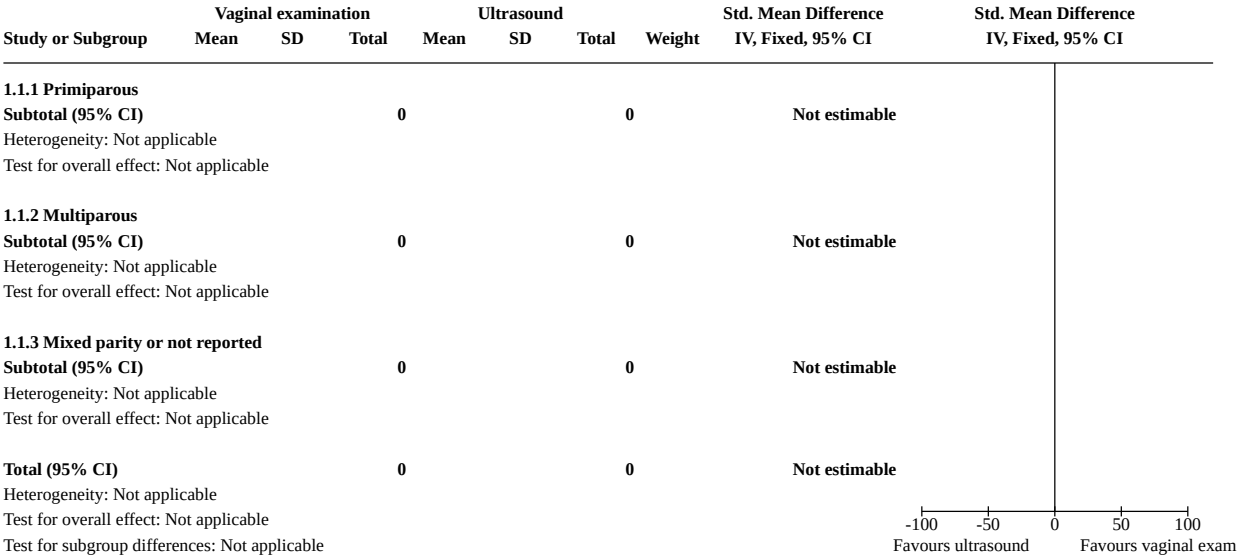
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.1.1 Primiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1.2 Multiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.1.3 Mixed parity or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 Augmentation of labour (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3 Spontaneous vaginal birth (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 Chorioamnionitis (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 Neonatal infection (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6 Admission to NICU (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.7 Maternal pain (primary outcome)	1	83	Mean Difference (IV, Fixed, 95% CI)	-1.29 [-2.10, -0.48]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.7.1 Primiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.7.2 Multiparous	1	83	Mean Difference (IV, Fixed, 95% CI)	-1.29 [-2.10, -0.48]
1.7.3 Mixed parity or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.8 Physiological labour and birth	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.9 Caesarean birth	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.10 Operative vaginal birth	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.11 Length of labour (in hours)	1	83	Mean Difference (IV, Fixed, 95% CI)	-2.30 [-4.66, 0.06]
1.12 Epidural for pain relief	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.13 Narcotics for pain relief	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.14 Maternal infection	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.15 Postpartum haemorrhage (≥ 1000 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.16 Postpartum haemorrhage (≥ 500 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.17 Severe perineal damage	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.18 Maternal incontinence at 6 weeks	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.19 Breatsfeeding/mixed feeding at 6 weeks postpartum	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.20 Postpartum depression/birth trauma/PTSD	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.21 Women's preference for the intervention in future	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.22 Maternal mortality or severe morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.23 Apgar < 7 at 5 minutes	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.24 Neonatal resuscitation	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.25 Neonatal fits/seizures	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.26 Hypoxic ischaemic encephalopathy	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

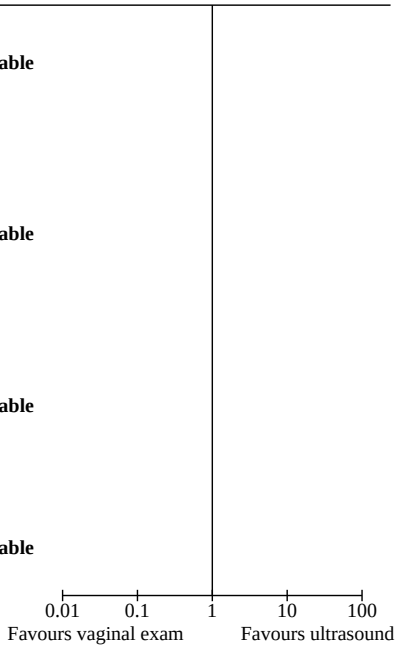
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.27 Perinatal mortality	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.28 Severe perinatal morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.29 Maternal anxiety - not pre-specified	1	83	Mean Difference (IV, Fixed, 95% CI)	2.59 [-1.63, 6.81]
1.30 Maternal comfort - not pre-specified	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Analysis 1.1. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 1: Positive birth experience (primary outcome)



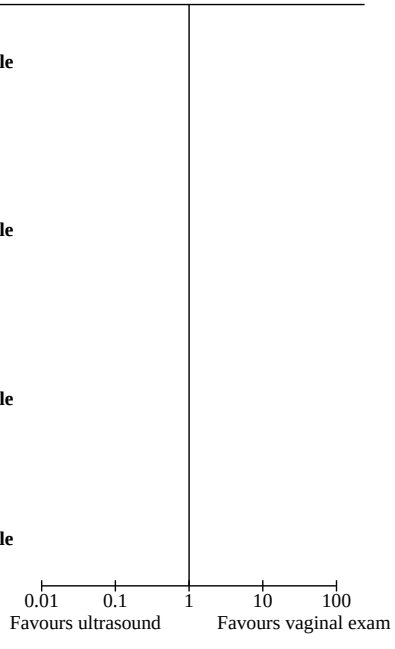
Analysis 1.2. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
1.2.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.2.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.2.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



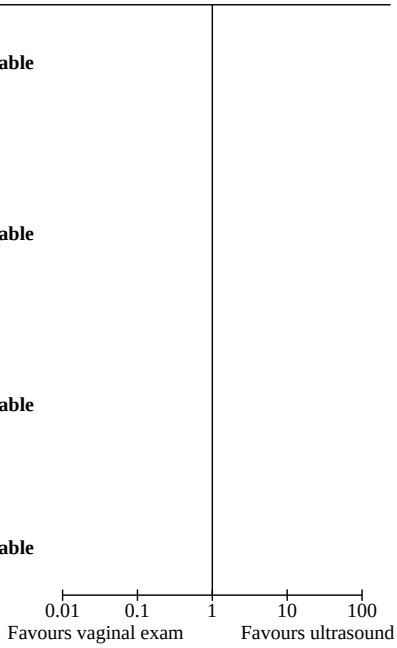
Analysis 1.3. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 3: Spontaneous vaginal birth (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
1.3.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.3.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.3.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 1.4. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 4: Chorioamnionitis (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
1.4.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.4.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.4.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 1.5. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 5: Neonatal infection (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
1.5.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.5.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.5.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						

Risk Ratio M-H, Fixed, 95% CI
0.01 0.1 1 10 100
Favours vaginal exam Favours ultrasound

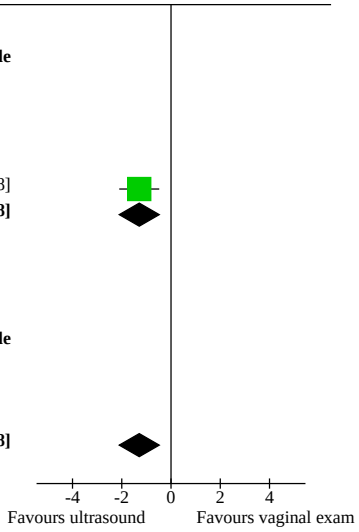
Analysis 1.6. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 6: Admission to NICU (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
1.6.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.6.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
1.6.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						

Risk Ratio M-H, Fixed, 95% CI
0.01 0.1 1 10 100
Favours vaginal exam Favours ultrasound

Analysis 1.7. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 7: Maternal pain (primary outcome)

Study or Subgroup	Vaginal examination Mean	SD	Total	Ultrasound Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
1.7.1 Primiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
1.7.2 Multiparous								
Seval 2016 (1)	4.3	1.17	41	5.59	2.41	42	100.0%	-1.29 [-2.10 , -0.48]
Subtotal (95% CI)			**41**			**42**	**100.0%**	**-1.29 [-2.10 , -0.48]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 3.11 (P = 0.002)								
1.7.3 Mixed parity or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**41**			**42**	**100.0%**	**-1.29 [-2.10 , -0.48]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 3.11 (P = 0.002)								
Test for subgroup differences: Not applicable								

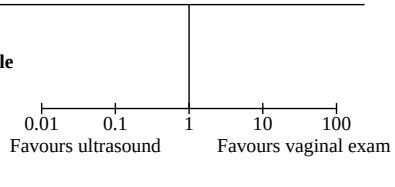


Footnotes

(1) Beginning of the active phase of labour (>6cm). VAS: 0 = worst pain and 10 = no pain

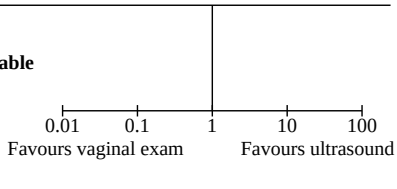
Analysis 1.8. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 8: Physiological labour and birth

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 1.9. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 9: Caesarean birth

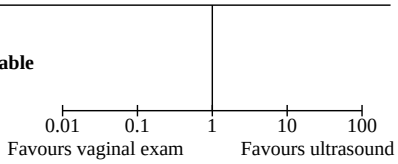
Study or Subgroup	Vaginal examination Events	Total	Utrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 1.10. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 10: Operative vaginal birth

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

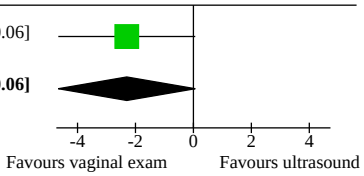
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.11. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 11: Length of labour (in hours)

Study or Subgroup	Vaginal examination Mean	Vaginal examination SD	Vaginal examination Total	Ultrasound Mean	Ultrasound SD	Ultrasound Total	Weight	Mean Difference IV, Fixed, 95% CI
Seval 2016	11.23	4.43	41	13.53	6.4	42	100.0%	-2.30 [-4.66 , 0.06]
Total (95% CI)			**41**			**42**	**100.0%**	**-2.30 [-4.66 , 0.06]**

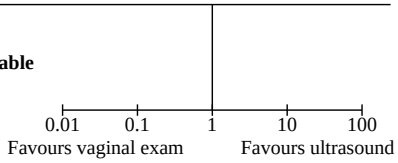
Heterogeneity: Not applicable
Test for overall effect: Z = 1.91 (P = 0.06)
Test for subgroup differences: Not applicable



Analysis 1.12. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 12: Epidural for pain relief

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

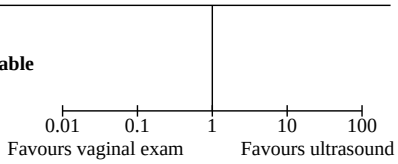
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.13. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 13: Narcotics for pain relief

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

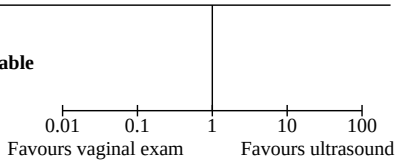
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.14. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 14: Maternal infection

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

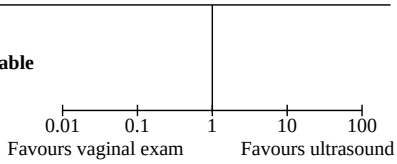
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.15. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 15: Postpartum haemorrhage (≥ 1000 mL)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

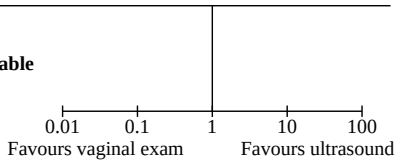
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.16. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 16: Postpartum haemorrhage (≥ 500 mL)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

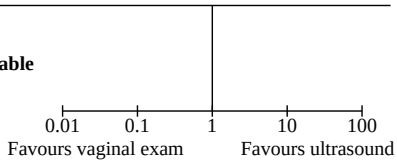
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.17. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 17: Severe perineal damage

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

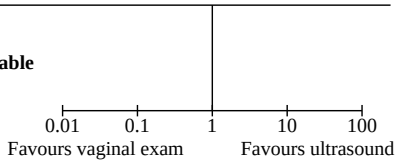
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.18. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 18: Maternal incontinence at 6 weeks

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

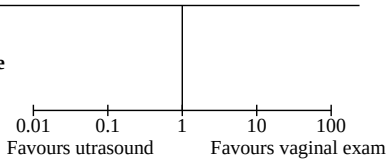
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.19. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 19: Breatsfeeding/mixed feeding at 6 weeks postpartum

Study or Subgroup	Favours utrasound Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

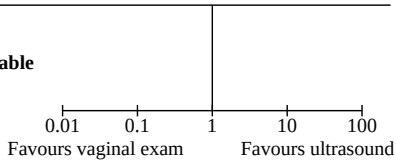
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.20. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 20: Postpartum depression/birth trauma/PTSD

Study or Subgroup	Vaginal examination Events	Total	Utrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

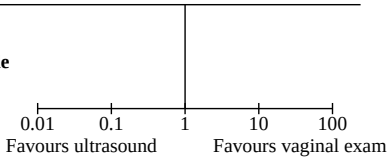
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.21. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 21: Women's preference for the intervention in future

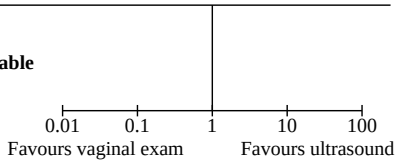
Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



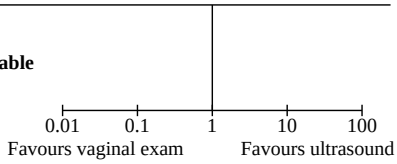
Analysis 1.22. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 22: Maternal mortality or severe morbidity

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



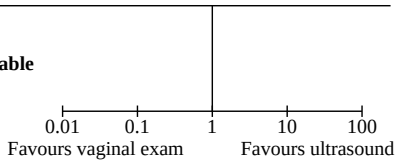
Analysis 1.23. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 23: Apgar < 7 at 5 minutes

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



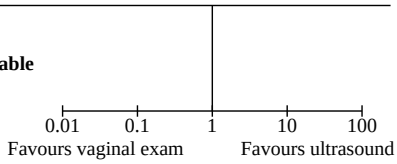
Analysis 1.24. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 24: Neonatal resuscitation

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 1.25. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 25: Neonatal fits/seizures

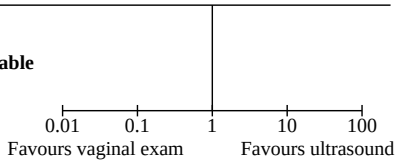
Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 1.26. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 26: Hypoxic ischaemic encephalopathy

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

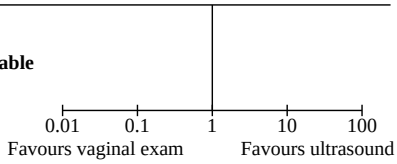
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.27. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 27: Perinatal mortality

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

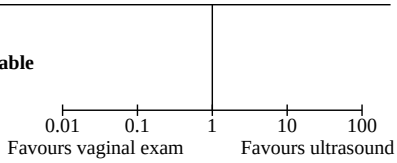
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 1.28. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 28: Severe perinatal morbidity

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

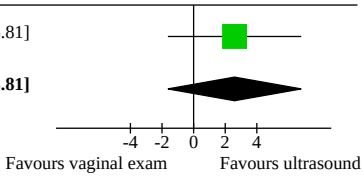
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



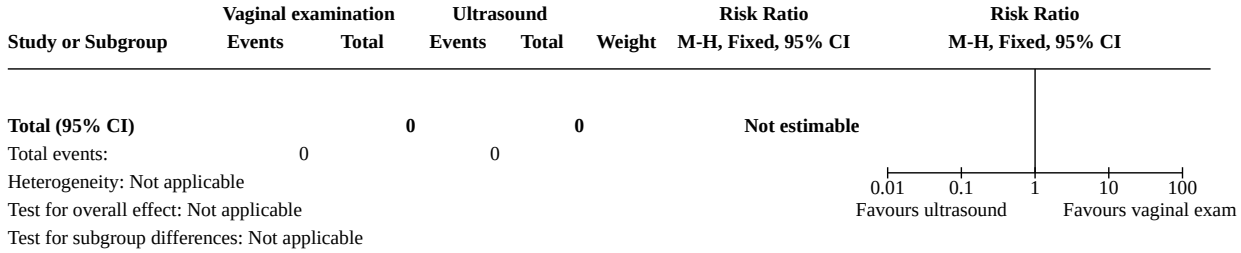
Analysis 1.29. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 29: Maternal anxiety - not prespecified

Study or Subgroup	Vaginal examination Mean	SD	Total	Ultrasound Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Seval 2016	48.18	10.76	41	45.59	8.72	42	100.0%	2.59 [-1.63 , 6.81]
Total (95% CI)			**41**			**42**	**100.0%**	**2.59 [-1.63 , 6.81]**

Heterogeneity: Not applicable
Test for overall effect: Z = 1.20 (P = 0.23)
Test for subgroup differences: Not applicable



Analysis 1.30. Comparison 1: Routine vaginal examination versus ultrasound (subgroup by parity), Outcome 30: Maternal comfort - not prespecified



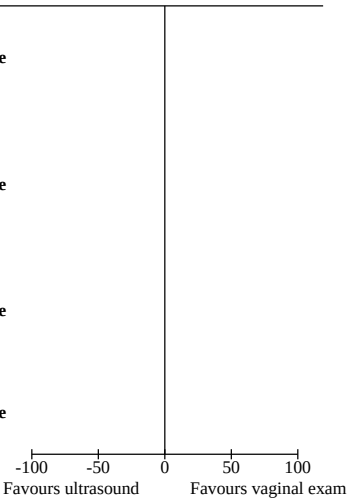
Comparison 2. Routine vaginal examination versus ultrasound (subgroup by country income)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.1.1 HIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.1.2 LMIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.1.3 Mixed H + LMIC or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.2 Augmentation of labour (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.3 Spontaneous vaginal birth (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.3.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.3.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.3.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.4 Chorioamnionitis (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.4.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.4.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.4.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.5 Neonatal infection (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.5.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.5.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.5.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.6 Admission to NICU (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.6.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.6.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.6.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.7 Maternal pain (primary outcome)	1	83	Mean Difference (IV, Fixed, 95% CI)	-1.29 [-2.10, -0.48]
2.7.1 HIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.7.2 LMIC	1	83	Mean Difference (IV, Fixed, 95% CI)	-1.29 [-2.10, -0.48]
2.7.3 Mixed H + LMIC or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

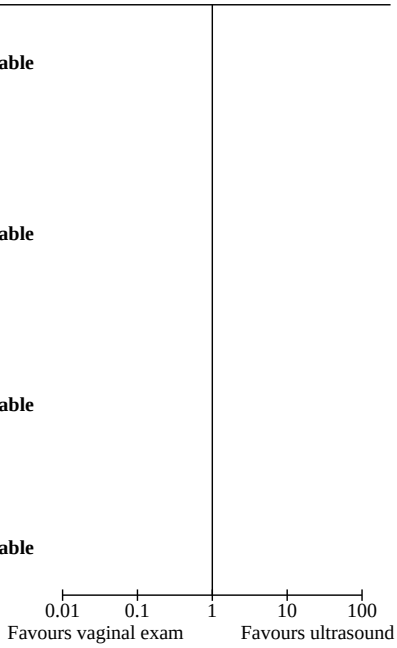
Analysis 2.1. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 1: Positive birth experience (primary outcome)

Study or Subgroup	Vaginal examination Mean	SD	Total	Ultrasound Mean	SD	Total	Weight	Std. Mean Difference IV, Fixed, 95% CI
2.1.1 HIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
2.1.2 LMIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
2.1.3 Mixed H + LMIC or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



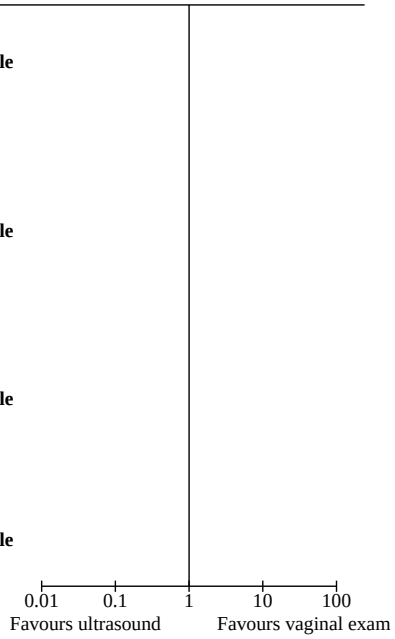
Analysis 2.2. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.2.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.2.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.2.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



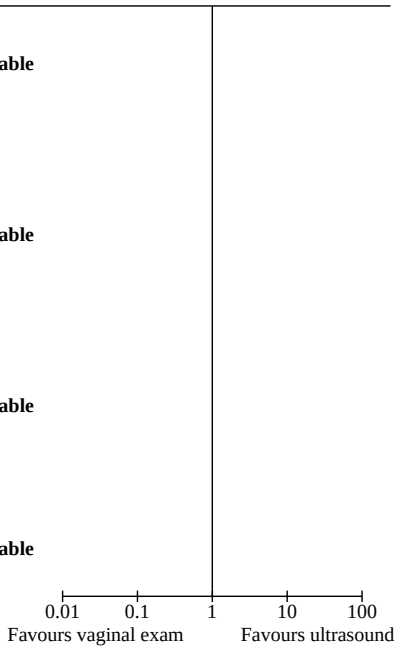
Analysis 2.3. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 3: Spontaneous vaginal birth (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.3.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.3.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.3.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



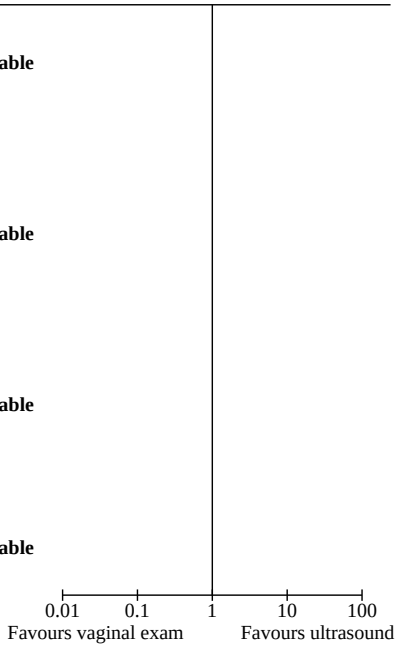
Analysis 2.4. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 4: Chorioamnionitis (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Ultrasound Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.4.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.4.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.4.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



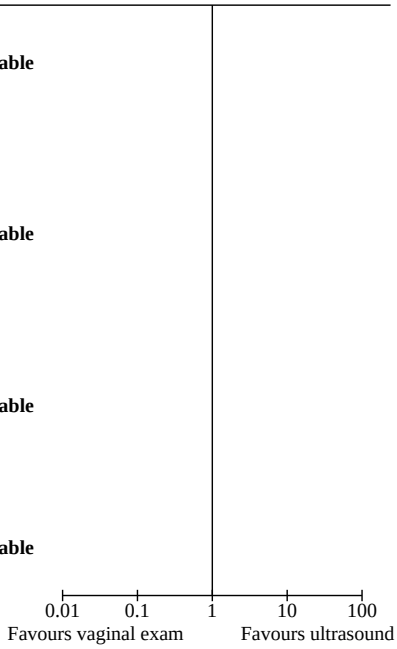
Analysis 2.5. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 5: Neonatal infection (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.5.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.5.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.5.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



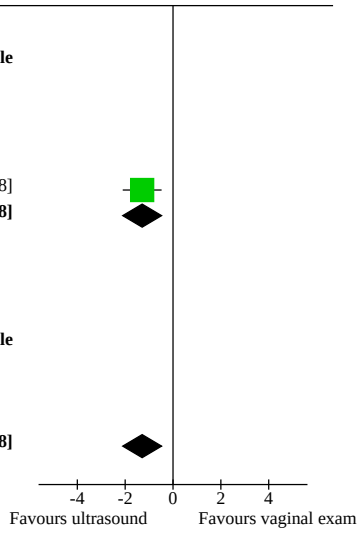
Analysis 2.6. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 6: Admission to NICU (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Ultrasound Events	Ultrasound Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.6.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.6.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
2.6.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 2.7. Comparison 2: Routine vaginal examination versus ultrasound (subgroup by country income), Outcome 7: Maternal pain (primary outcome)

Study or Subgroup	Vaginal examination Mean	Vaginal examination SD	Vaginal examination Total	Ultrasound Mean	Ultrasound SD	Ultrasound Total	Weight	Mean Difference IV, Fixed, 95% CI
2.7.1 HIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
2.7.2 LMIC								
Seval 2016 (1)	4.3	1.17	41	5.59	2.41	42	100.0%	-1.29 [-2.10 , -0.48]
Subtotal (95% CI)			**41**			**42**	**100.0%**	**-1.29 [-2.10 , -0.48]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 3.11 (P = 0.002)								
2.7.3 Mixed H + LMIC or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**41**			**42**	**100.0%**	**-1.29 [-2.10 , -0.48]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 3.11 (P = 0.002)								
Test for subgroup differences: Not applicable								



Footnotes

(1) Beginning of the active phase of labour (>6cm). VAS: 0 = worst pain and 10 = no pain

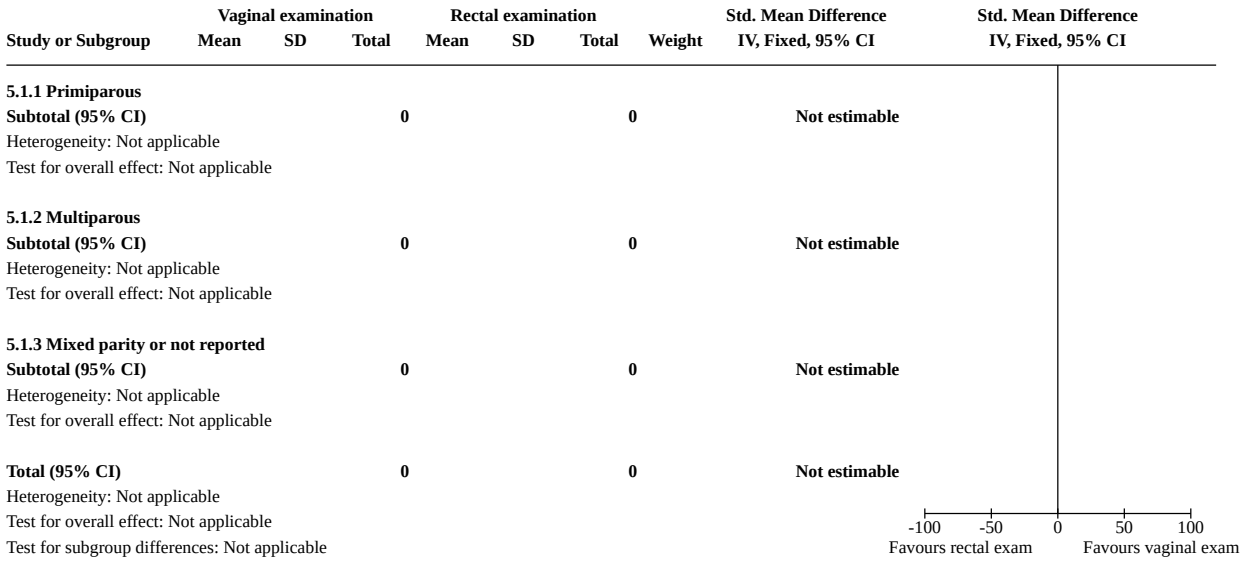
Comparison 5. Routine vaginal examination versus rectal examination (subgroup by parity)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.1.1 Primiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.1.2 Multiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.1.3 Mixed parity or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Augmentation of labour (primary outcome)	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.63, 1.68]
5.2.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2.3 Mixed parity or not reported	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.63, 1.68]
5.3 Spontaneous vaginal birth (primary outcome)	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.90, 1.06]
5.3.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.3.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.3.3 Mixed parity or not reported	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.90, 1.06]
5.4 Chorioamnionitis (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.4.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.4.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.4.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.5 Neonatal infection (primary outcome)	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.07]
5.5.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.5.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.5.3 Mixed parity or not reported	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.07]
5.6 Admission to NICU	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.32 [0.47, 3.73]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.6.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.6.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.6.3 Mixed parity or not reported	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.32 [0.47, 3.73]
5.7 Maternal pain (primary outcome)	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.7.1 Primiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.7.2 Multiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.7.3 Mixed parity or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.8 Physiological labour and birth	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.9 Caesarean birth	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.03, 3.15]
5.10 Operative vaginal birth	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.38 [0.70, 2.71]
5.11 Length of labour (in hours)	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.12 Epidural for pain relief	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.13 Narcotics for pain relief	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.14 Maternal infection	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.15 Postpartum haemorrhage (≥ 1000 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.16 Postpartum haemorrhage (≥ 500 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.17 Severe perineal damage	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.18 Maternal incontinence at 6 weeks	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.19 Breastfeeding/mixed feeding at 6 weeks	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.20 Postpartum depression/birth trauma/PTSD	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.21 Women's preference for the intervention in future	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.22 Maternal mortality or severe morbidity (composite)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

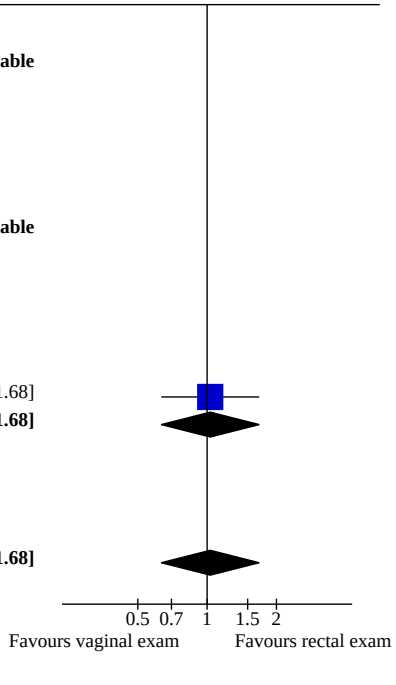
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.23 Apgar < 7 at 5 minutes	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.24 Neonatal resuscitation	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.25 Neonatal fits/seizures	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.26 Hypoxic ischaemic encephalopathy	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.27 Perinatal mortality	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.99 [0.06, 15.74]
5.28 Severe perinatal morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.29 Maternal anxiety - not prespecified	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.30 Maternal comfort - not prespecified	1	303	Risk Ratio (M-H, Fixed, 95% CI)	2.68 [1.64, 4.39]

Analysis 5.1. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 1: Positive birth experience (primary outcome)



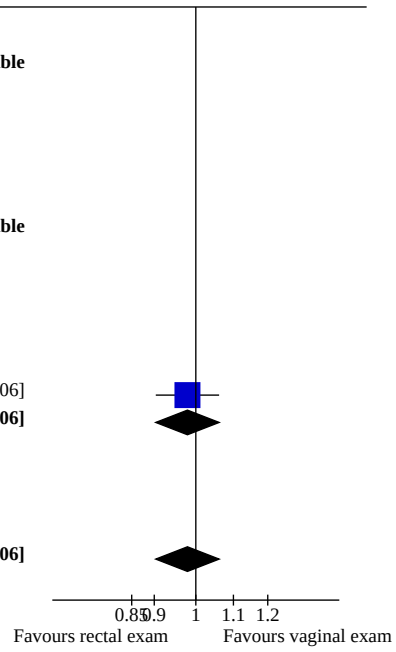
Analysis 5.2. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
5.2.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.2.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.2.3 Mixed parity or not reported						
Murphy 1986	27	154	26	153	100.0%	1.03 [0.63 , 1.68]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**1.03 [0.63 , 1.68]**
Total events:	27		26			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
Total (95% CI)		**154**		**153**	**100.0%**	**1.03 [0.63 , 1.68]**
Total events:	27		26			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
Test for subgroup differences: Not applicable						



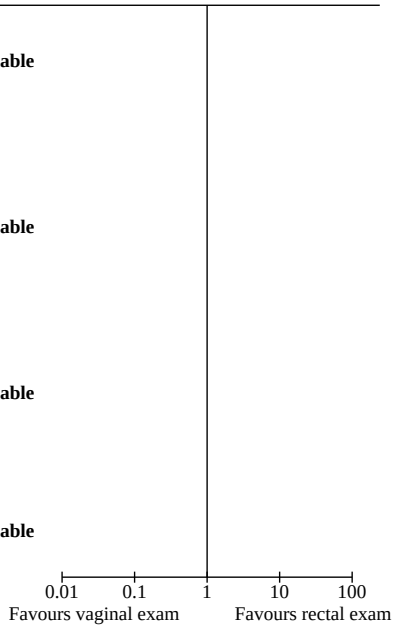
Analysis 5.3. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 3: Spontaneous vaginal birth (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
5.3.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.3.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.3.3 Mixed parity or not reported						
Murphy 1986	135	154	137	153	100.0%	0.98 [0.90 , 1.06]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**0.98 [0.90 , 1.06]**
Total events:	135		137			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.52 (P = 0.60)						
Total (95% CI)		**154**		**153**	**100.0%**	**0.98 [0.90 , 1.06]**
Total events:	135		137			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.52 (P = 0.60)						
Test for subgroup differences: Not applicable						



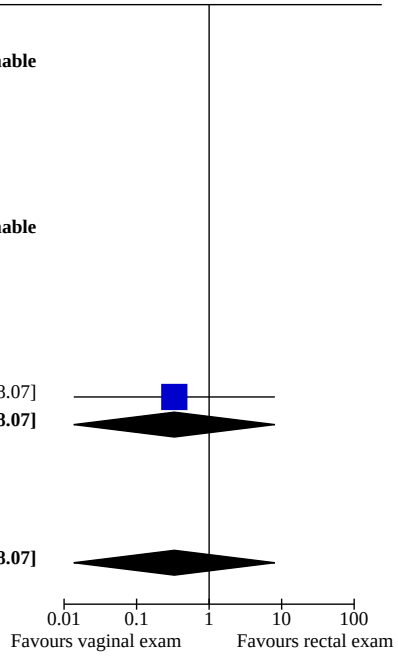
Analysis 5.4. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 4: Chorioamnionitis (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
5.4.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.4.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.4.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 5.5. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 5: Neonatal infection (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
5.5.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.5.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.5.3 Mixed parity or not reported						
Murphy 1986 (1)	0	154	1	153	100.0%	0.33 [0.01 , 8.07]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**0.33 [0.01 , 8.07]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Total (95% CI)		**154**		**153**	**100.0%**	**0.33 [0.01 , 8.07]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Test for subgroup differences: Not applicable						

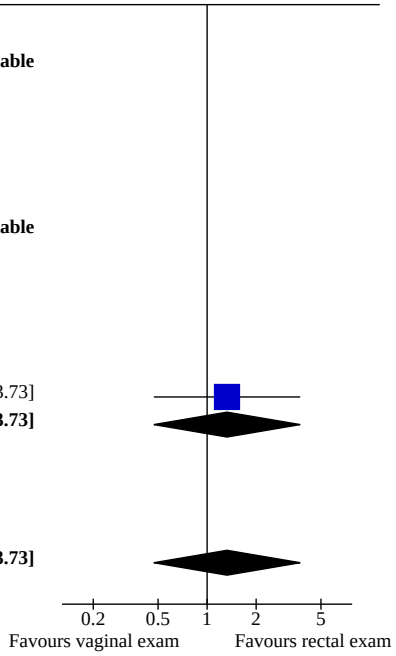


Footnotes

(1) Group B streptococcus

Analysis 5.6. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 6: Admission to NICU

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
5.6.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.6.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
5.6.3 Mixed parity or not reported						
Murphy 1986 (1)	8	154	6	153	100.0%	1.32 [0.47 , 3.73]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**1.32 [0.47 , 3.73]**
Total events:	8		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.53 (P = 0.59)						
Total (95% CI)		**154**		**153**	**100.0%**	**1.32 [0.47 , 3.73]**
Total events:	8		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.53 (P = 0.59)						
Test for subgroup differences: Not applicable						

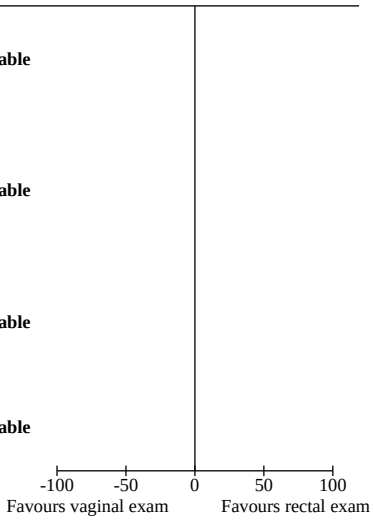


Footnotes

(1) Reported as Special Care Baby Unit (SCBU)

Analysis 5.7. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 7: Maternal pain (primary outcome)

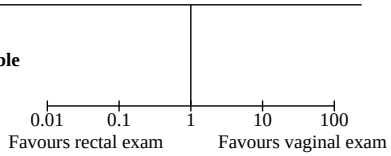
Study or Subgroup	Vaginal examination Mean	SD	Total	Rectal examination Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
5.7.1 Primiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
5.7.2 Multiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
5.7.3 Mixed parity or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



Analysis 5.8. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 8: Physiological labour and birth

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

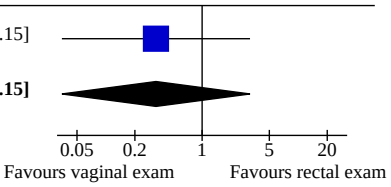
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.9. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 9: Caesarean birth

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Murphy 1986	1	154	3	153	100.0%	0.33 [0.03 , 3.15]
Total (95% CI)		**154**		**153**	**100.0%**	**0.33 [0.03 , 3.15]**
Total events:	1		3			

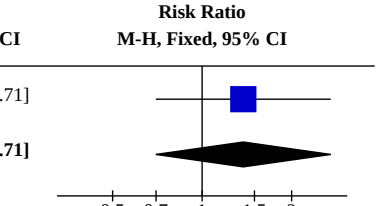
Heterogeneity: Not applicable
Test for overall effect: Z = 0.96 (P = 0.34)
Test for subgroup differences: Not applicable



Analysis 5.10. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 10: Operative vaginal birth

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Murphy 1986	18	154	13	153	100.0%	1.38 [0.70 , 2.71]
Total (95% CI)		**154**		**153**	**100.0%**	**1.38 [0.70 , 2.71]**
Total events:	18		13			

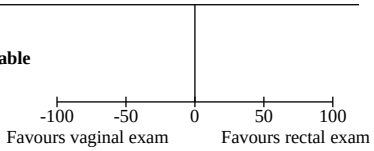
Heterogeneity: Not applicable
Test for overall effect: Z = 0.92 (P = 0.36)
Test for subgroup differences: Not applicable



Analysis 5.11. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 11: Length of labour (in hours)

Study or Subgroup	Vaginal examination Mean	Vaginal examination SD	Vaginal examination Total	Rectal examination Mean	Rectal examination SD	Rectal examination Total	Weight	Mean Difference IV, Fixed, 95% CI
Total (95% CI)			**0**			**0**		**Not estimable**

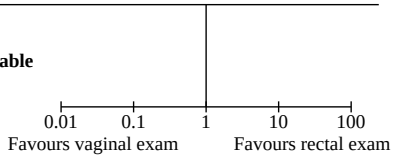
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.12. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 12: Epidural for pain relief

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

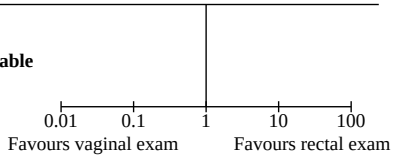
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.13. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 13: Narcotics for pain relief

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

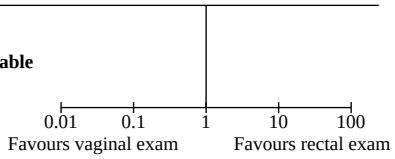
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.14. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 14: Maternal infection

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

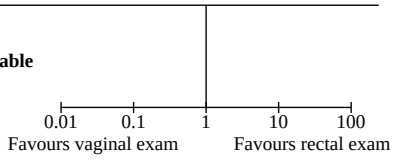
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.15. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 15: Postpartum haemorrhage (≥ 1000 mL)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

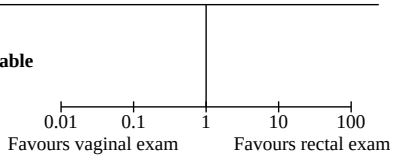
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.16. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 16: Postpartum haemorrhage (≥ 500 mL)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

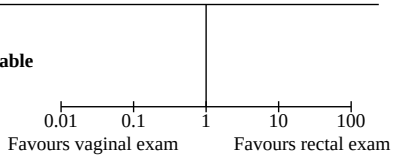
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.17. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 17: Severe perineal damage

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

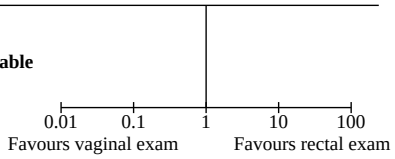
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.18. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 18: Maternal incontinence at 6 weeks

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

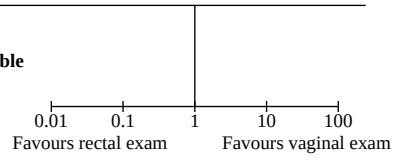
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.19. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 19: Breastfeeding/mixed feeding at 6 weeks

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

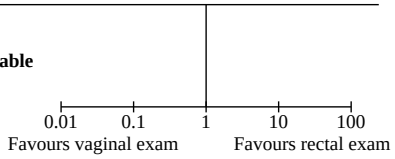
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.20. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 20: Postpartum depression/birth trauma/PTSD

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

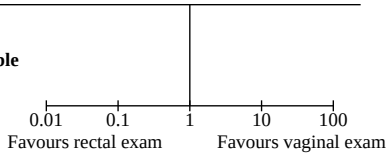
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.21. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 21: Women's preference for the intervention in future

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

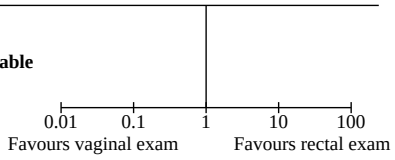
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.22. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 22: Maternal mortality or severe morbidity (composite)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

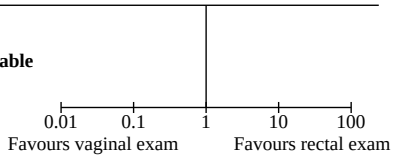
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.23. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 23: Apgar < 7 at 5 minutes

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

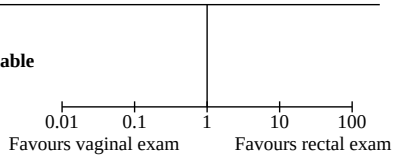
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.24. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 24: Neonatal resuscitation

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

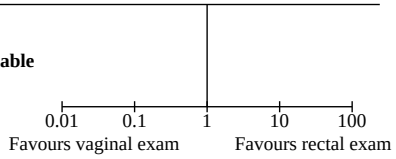
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.25. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 25: Neonatal fits/seizures

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

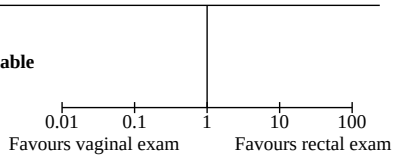
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.26. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 26: Hypoxic ischaemic encephalopathy

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

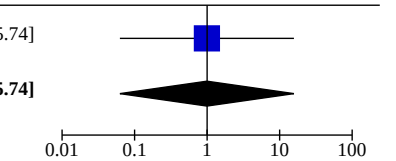
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.27. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 27: Perinatal mortality

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Murphy 1986 (1)	1	154	1	153	100.0%	0.99 [0.06 , 15.74]
Total (95% CI)		**154**		**153**	**100.0%**	**0.99 [0.06 , 15.74]**
Total events:	1		1			

Heterogeneity: Not applicable
Test for overall effect: Z = 0.00 (P = 1.00)
Test for subgroup differences: Not applicable



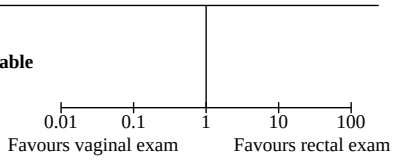
Footnotes

(1) Of the two perinatal mortalities, one was a stillbirth in the rectal examination group, and the other a neonatal death in the vaginal examination group.

Analysis 5.28. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 28: Severe perinatal morbidity

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

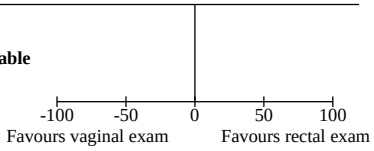
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.29. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 29: Maternal anxiety - not prespecified

Study or Subgroup	Vaginal examination Mean	Vaginal examination SD	Vaginal examination Total	Rectal examination Mean	Rectal examination SD	Rectal examination Total	Weight	Mean Difference IV, Fixed, 95% CI
Total (95% CI)			**0**			**0**		**Not estimable**

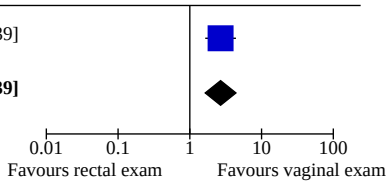
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.30. Comparison 5: Routine vaginal examination versus rectal examination (subgroup by parity), Outcome 30: Maternal comfort - not prespecified

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Murphy 1986 (1)	48	151	18	152	100.0%	2.68 [1.64 , 4.39]
Total (95% CI)		**151**		**152**	**100.0%**	**2.68 [1.64 , 4.39]**
Total events:	48		18			

Heterogeneity: Not applicable
Test for overall effect: Z = 3.93 (P < 0.0001)
Test for subgroup differences: Not applicable



Footnotes
(1) Women reporting the examination was 'Not uncomfortable'

Comparison 6. Routine vaginal examination versus rectal examination (subgroup by country income)

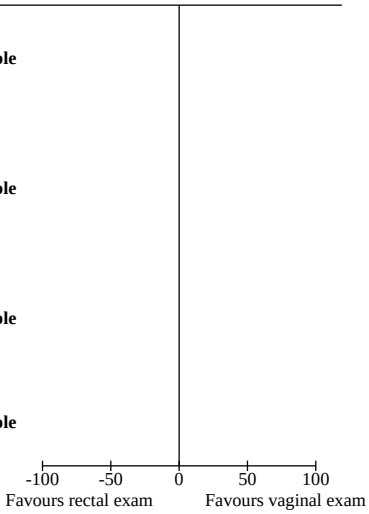
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.1 Positive birth experience	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.1.1 HIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.1.2 LMIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.1.3 Mixed H & LMIC or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2 Augmentation of labour (primary outcome)	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.63, 1.68]
6.2.1 HIC	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.63, 1.68]
6.2.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Spontaneous vaginal birth (primary outcome)	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.90, 1.06]
6.3.1 HIC	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.90, 1.06]
6.3.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Chorioamnionitis (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5 Neonatal infection (primary outcome)	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.07]
6.5.1 HIC	1	307	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.07]
6.5.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.6 Admission to NICU	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.32 [0.47, 3.73]
6.6.1 HIC	1	307	Risk Ratio (M-H, Fixed, 95% CI)	1.32 [0.47, 3.73]
6.6.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.6.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.7 Maternal pain (primary outcome)	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.7.1 HIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.7.2 LMIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.7.3 Mixed H & LMIC or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

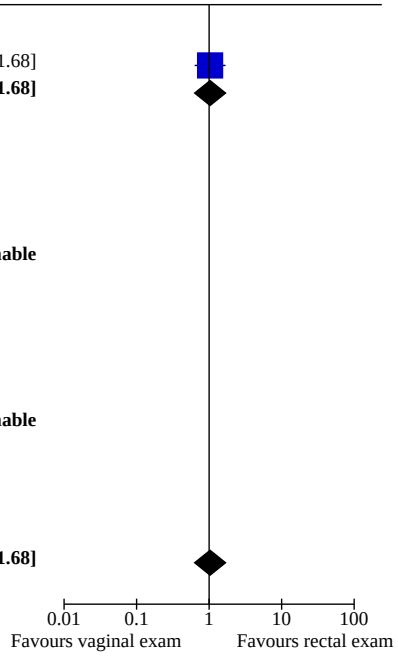
Analysis 6.1. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 1: Positive birth experience

Study or Subgroup	Vaginal examination Mean	SD	Total	Rectal examination Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
6.1.1 HIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
6.1.2 LMIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
6.1.3 Mixed H & LMIC or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



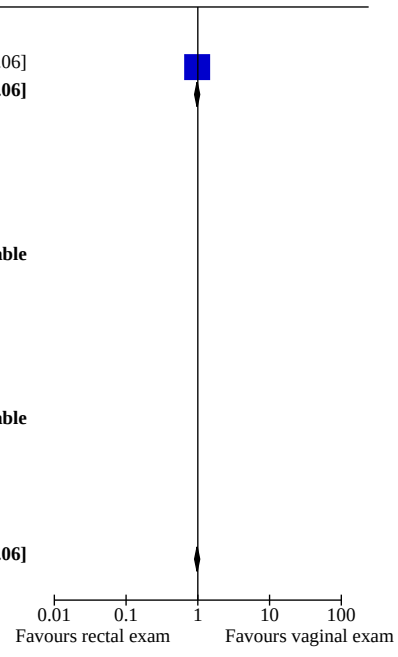
Analysis 6.2. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
6.2.1 HIC						
Murphy 1986	27	154	26	153	100.0%	1.03 [0.63 , 1.68]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**1.03 [0.63 , 1.68]**
Total events:	27		26			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
6.2.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
6.2.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**154**		**153**	**100.0%**	**1.03 [0.63 , 1.68]**
Total events:	27		26			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
Test for subgroup differences: Not applicable						



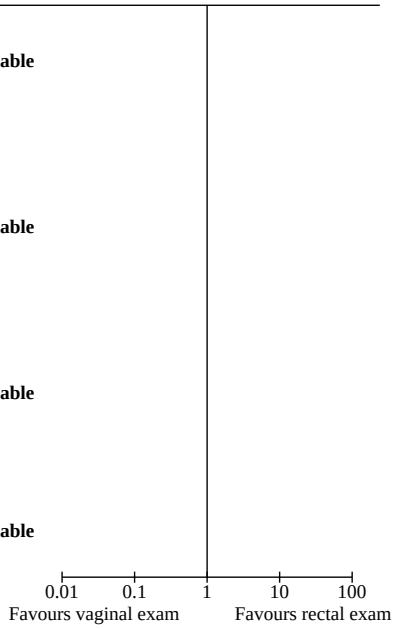
Analysis 6.3. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 3: Spontaneous vaginal birth (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
6.3.1 HIC						
Murphy 1986	135	154	137	153	100.0%	0.98 [0.90 , 1.06]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**0.98 [0.90 , 1.06]**
Total events:	135		137			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.52 (P = 0.60)						
6.3.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
6.3.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**154**		**153**	**100.0%**	**0.98 [0.90 , 1.06]**
Total events:	135		137			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.52 (P = 0.60)						
Test for subgroup differences: Not applicable						



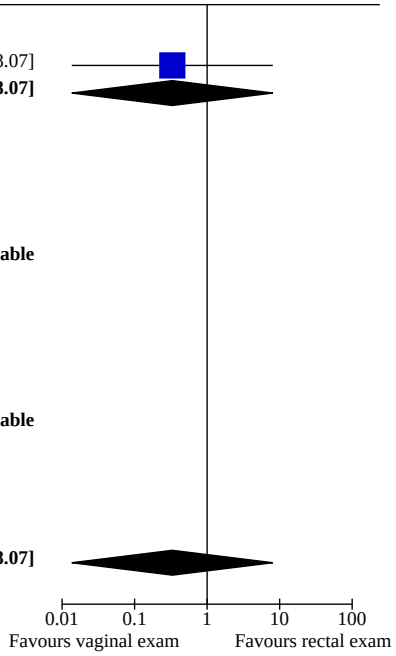
Analysis 6.4. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 4: Chorioamnionitis (primary outcome)

Study or Subgroup	Vaginal examination Events	Vaginal examination Total	Rectal examination Events	Rectal examination Total	Weight	Risk Ratio M-H, Fixed, 95% CI
6.4.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
6.4.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
6.4.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 6.5. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 5: Neonatal infection (primary outcome)

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
6.5.1 HIC						
Murphy 1986 (1)	0	154	1	153	100.0%	0.33 [0.01 , 8.07]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**0.33 [0.01 , 8.07]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
6.5.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
6.5.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**154**		**153**	**100.0%**	**0.33 [0.01 , 8.07]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Test for subgroup differences: Not applicable						

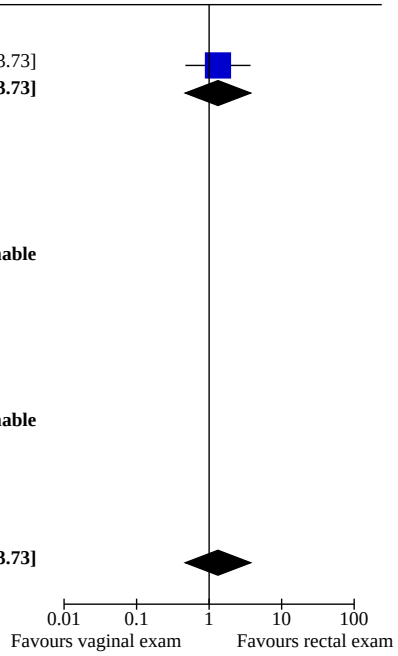


Footnotes

(1) Group B streptococcus

Analysis 6.6. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 6: Admission to NICU

Study or Subgroup	Vaginal examination Events	Total	Rectal examination Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
6.6.1 HIC						
Murphy 1986 (1)	8	154	6	153	100.0%	1.32 [0.47 , 3.73]
Subtotal (95% CI)		**154**		**153**	**100.0%**	**1.32 [0.47 , 3.73]**
Total events:	8		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.53 (P = 0.59)						
6.6.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
6.6.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**154**		**153**	**100.0%**	**1.32 [0.47 , 3.73]**
Total events:	8		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.53 (P = 0.59)						
Test for subgroup differences: Not applicable						

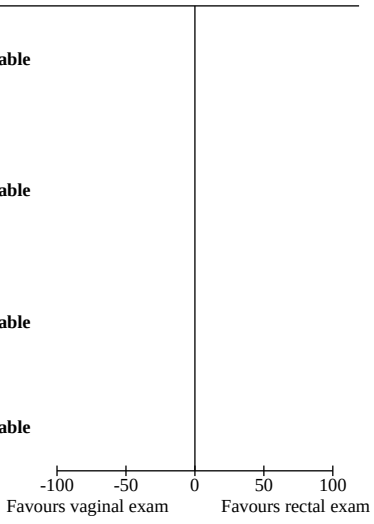


Footnotes

(1) Reported as Special Care Baby Unit (SCBU)

Analysis 6.7. Comparison 6: Routine vaginal examination versus rectal examination (subgroup by country income), Outcome 7: Maternal pain (primary outcome)

Study or Subgroup	Vaginal examination Mean	SD	Total	Rectal examination Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
6.7.1 HIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
6.7.2 LMIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
6.7.3 Mixed H & LMIC or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



Comparison 7. Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity)

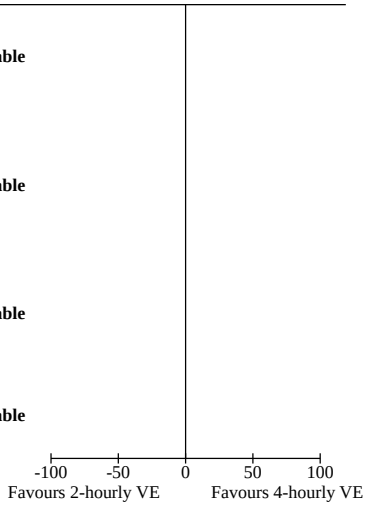
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.1.1 Primiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.1.2 Multiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.1.3 Mixed parity or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.2 Augmentation of labour (primary outcome)	1	109	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.60, 1.57]
7.2.1 Primiparous	1	109	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.60, 1.57]
7.2.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.2.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.3 Spontaneous vaginal birth (primary outcome)	1	150	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.83, 1.26]
7.3.1 Primiparous	1	150	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.83, 1.26]
7.3.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.3.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4 Chorioamnionitis (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.5 Neonatal infection (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.5.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.5.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.5.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.6 Admission to NICU (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.6.1 Primiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.6.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.6.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.7 Maternal pain (primary outcome)	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.7.1 Primiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.7.2 Multiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.7.3 Mixed parity or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.8 Physiological labour and birth	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.9 Caesarean birth	1	150	Risk Ratio (M-H, Fixed, 95% CI)	1.30 [0.61, 2.78]
7.10 Operative vaginal birth	1	150	Risk Ratio (M-H, Fixed, 95% CI)	0.69 [0.32, 1.52]
7.11 Length of labour (in hours)	1	109	Mean Difference (IV, Fixed, 95% CI)	0.10 [-1.28, 1.48]
7.12 Epidural for pain relief	1	109	Risk Ratio (M-H, Fixed, 95% CI)	1.30 [0.65, 2.60]
7.13 Narcotics for pain relief	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.14 Maternal infection	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.15 Postpartum haemorrhage (≥ 1000 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.16 Postpartum haemorrhage (≥ 500 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.17 Severe perineal damage	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.18 Maternal incontinence at 6 weeks	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.19 Breastfeeding/mixed feeding at 6 weeks postpartum	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.20 Postpartum depression/birth trauma/PTSD	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.21 Women's preference for the intervention in future	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.22 Maternal mortality or severe morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.23 Apgar < 7 at 5 minutes	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.24 Neonatal resuscitation	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.25 Neonatal fits/seizures	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.26 Hypoxic ischaemic encephalopathy	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.27 Perinatal mortality	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.28 Severe perinatal morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.29 Maternal anxiety - not prespecified	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.30 Maternal comfort - not prespecified	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

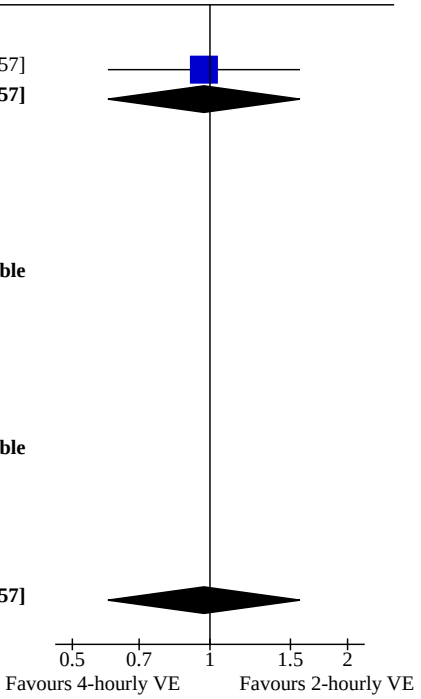
Analysis 7.1. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 1: Positive birth experience (primary outcome)

Study or Subgroup	4-hourly VE Mean	SD	Total	2-hourly VE Mean	SD	Total	Weight	Std. Mean Difference IV, Fixed, 95% CI
7.1.1 Primiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
7.1.2 Multiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
7.1.3 Mixed parity or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



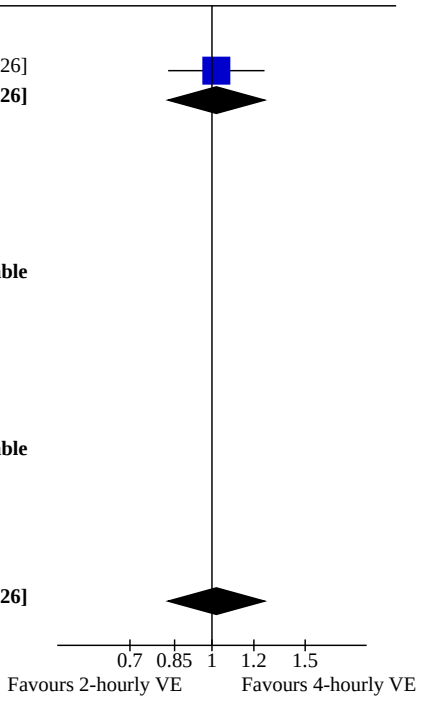
Analysis 7.2. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
7.2.1 Primiparous						
Abukhalil 1996	20	54	21	55	100.0%	0.97 [0.60 , 1.57]
Subtotal (95% CI)		**54**		**55**	**100.0%**	**0.97 [0.60 , 1.57]**
Total events:	20		21			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
7.2.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.2.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**54**		**55**	**100.0%**	**0.97 [0.60 , 1.57]**
Total events:	20		21			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
Test for subgroup differences: Not applicable						



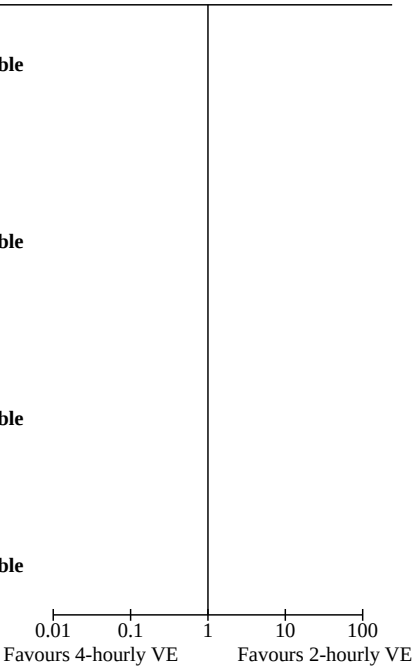
Analysis 7.3. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 3: Spontaneous vaginal birth (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
7.3.1 Primiparous						
Abukhalil 1996	53	75	52	75	100.0%	1.02 [0.83 , 1.26]
Subtotal (95% CI)		**75**		**75**	**100.0%**	**1.02 [0.83 , 1.26]**
Total events:	53		52			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.18 (P = 0.86)						
7.3.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.3.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**75**		**75**	**100.0%**	**1.02 [0.83 , 1.26]**
Total events:	53		52			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.18 (P = 0.86)						
Test for subgroup differences: Not applicable						



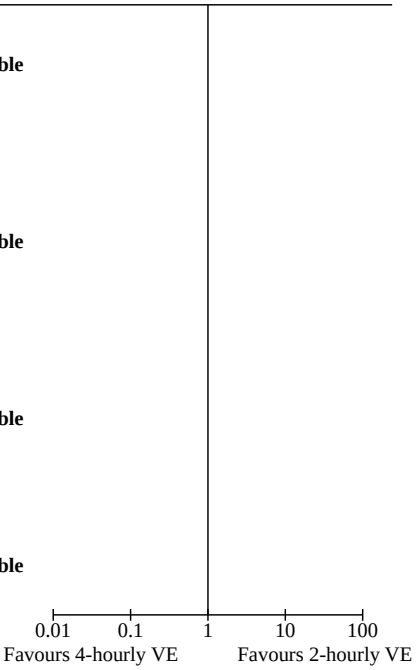
Analysis 7.4. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 4: Chorioamnionitis (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
7.4.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.4.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.4.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



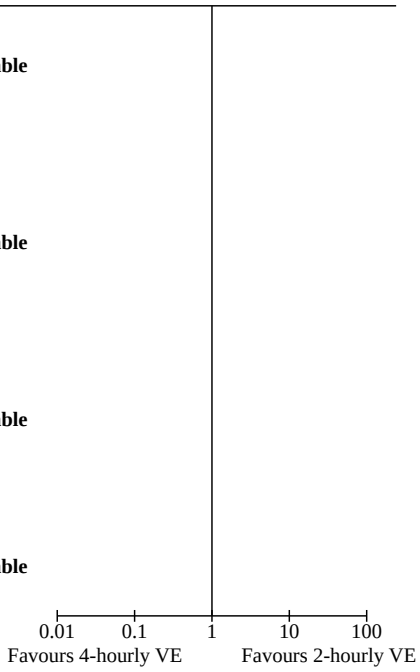
Analysis 7.5. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 5: Neonatal infection (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
7.5.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.5.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.5.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



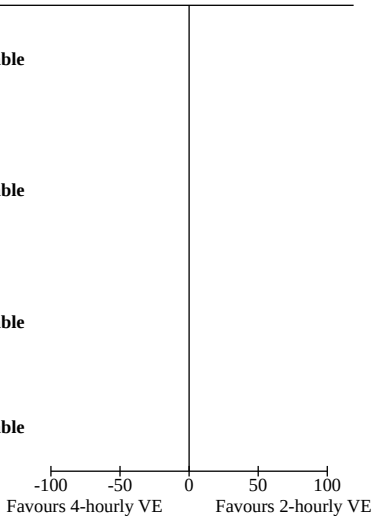
Analysis 7.6. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 6: Admission to NICU (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
7.6.1 Primiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.6.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
7.6.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 7.7. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 7: Maternal pain (primary outcome)

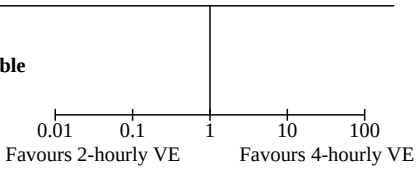
Study or Subgroup	4-hourly VE Mean	4-hourly VE SD	4-hourly VE Total	2-hourly VE Mean	2-hourly VE SD	2-hourly VE Total	Weight	Mean Difference IV, Fixed, 95% CI
7.7.1 Primiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
7.7.2 Multiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
7.7.3 Mixed parity or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



Analysis 7.8. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 8: Physiological labour and birth

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

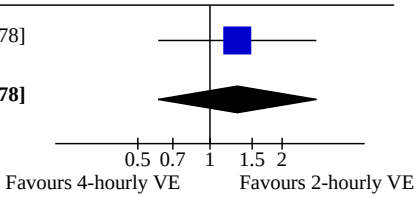
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.9. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 9: Caesarean birth

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Abukhalil 1996	13	75	10	75	100.0%	1.30 [0.61 , 2.78]
Total (95% CI)		**75**		**75**	**100.0%**	**1.30 [0.61 , 2.78]**
Total events:	13		10			

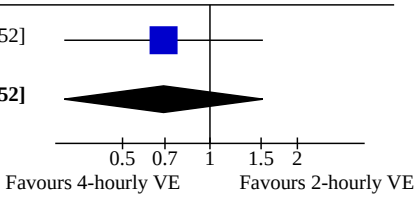
Heterogeneity: Not applicable
Test for overall effect: Z = 0.68 (P = 0.50)
Test for subgroup differences: Not applicable



Analysis 7.10. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 10: Operative vaginal birth

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Abukhalil 1996	9	75	13	75	100.0%	0.69 [0.32 , 1.52]
Total (95% CI)		**75**		**75**	**100.0%**	**0.69 [0.32 , 1.52]**
Total events:	9		13			

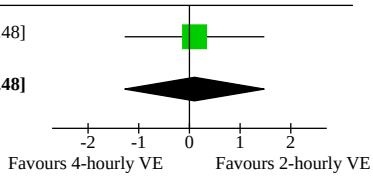
Heterogeneity: Not applicable
Test for overall effect: Z = 0.92 (P = 0.36)
Test for subgroup differences: Not applicable



Analysis 7.11. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 11: Length of labour (in hours)

Study or Subgroup	4 -hourly VE Mean	4 -hourly VE SD	4 -hourly VE Total	2-hourly VE Mean	2-hourly VE SD	2-hourly VE Total	Weight	Mean Difference IV, Fixed, 95% CI
Abukhalil 1996	6.76	4.07	54	6.66	3.21	55	100.0%	0.10 [-1.28 , 1.48]
Total (95% CI)			**54**			**55**	**100.0%**	**0.10 [-1.28 , 1.48]**

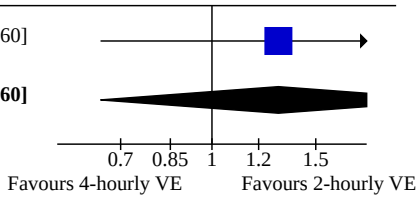
Heterogeneity: Not applicable
Test for overall effect: Z = 0.14 (P = 0.89)
Test for subgroup differences: Not applicable



Analysis 7.12. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 12: Epidural for pain relief

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Abukhalil 1996	14	54	11	55	100.0%	1.30 [0.65 , 2.60]
Total (95% CI)		**54**		**55**	**100.0%**	**1.30 [0.65 , 2.60]**
Total events:	14		11			

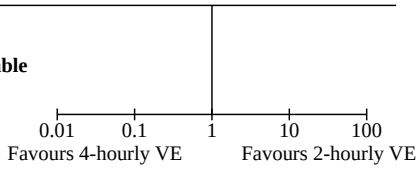
Heterogeneity: Not applicable
Test for overall effect: Z = 0.73 (P = 0.46)
Test for subgroup differences: Not applicable



Analysis 7.13. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 13: Narcotics for pain relief

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

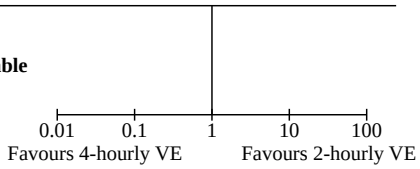
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.14. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 14: Maternal infection

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

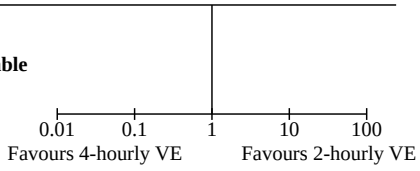
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.15. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 15: Postpartum haemorrhage (≥ 1000 mL)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

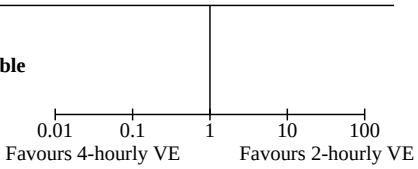
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.16. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 16: Postpartum haemorrhage (≥ 500 mL)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

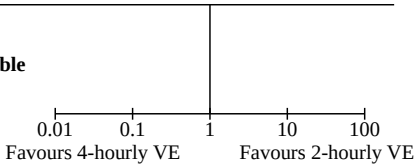
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.17. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 17: Severe perineal damage

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

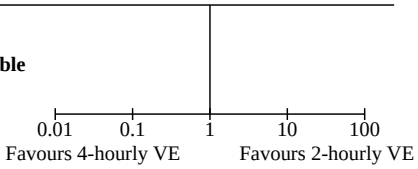
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.18. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 18: Maternal incontinence at 6 weeks

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

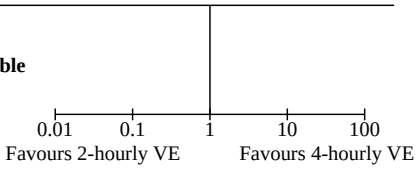
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.19. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 19: Breastfeeding/mixed feeding at 6 weeks postpartum

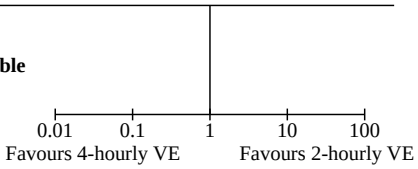
Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



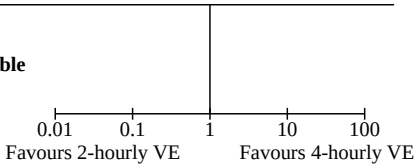
Analysis 7.20. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 20: Postpartum depression/birth trauma/PTSD

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**	
Total events:	0		0				
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
Test for subgroup differences: Not applicable							



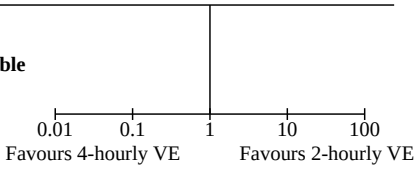
Analysis 7.21. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 21: Women's preference for the intervention in future

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**	
Total events:	0		0				
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
Test for subgroup differences: Not applicable							



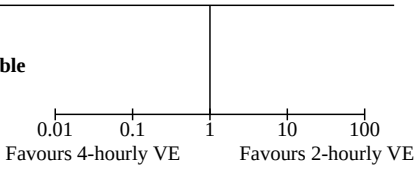
Analysis 7.22. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 22: Maternal mortality or severe morbidity

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**	
Total events:	0		0				
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
Test for subgroup differences: Not applicable							



Analysis 7.23. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 23: Apgar < 7 at 5 minutes

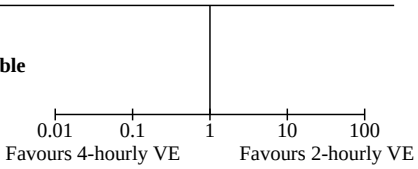
Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**	
Total events:	0		0				
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
Test for subgroup differences: Not applicable							



Analysis 7.24. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 24: Neonatal resuscitation

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

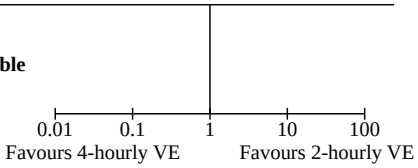
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.25. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 25: Neonatal fits/seizures

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

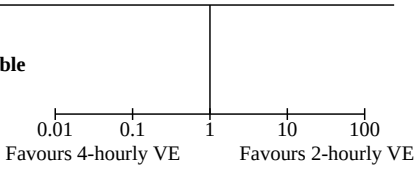
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 7.26. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 26: Hypoxic ischaemic encephalopathy

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

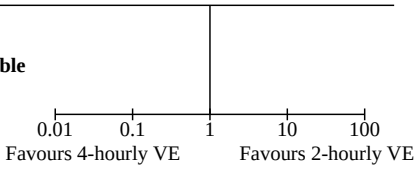
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



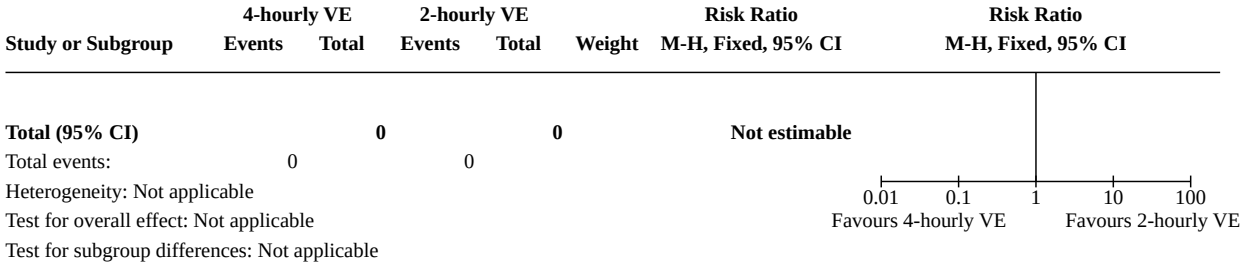
Analysis 7.27. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 27: Perinatal mortality

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

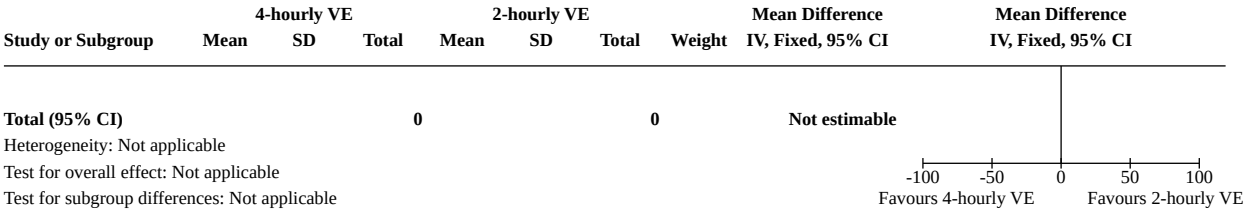
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



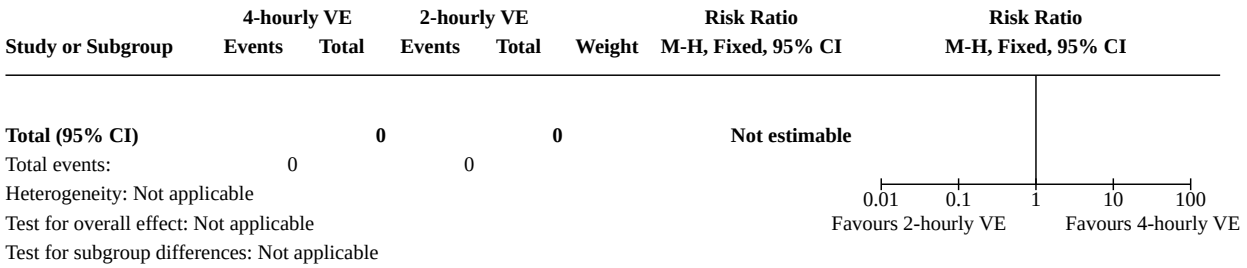
Analysis 7.28. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 28: Severe perinatal morbidity



Analysis 7.29. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 29: Maternal anxiety - not prespecified



Analysis 7.30. Comparison 7: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by parity), Outcome 30: Maternal comfort - not prespecified



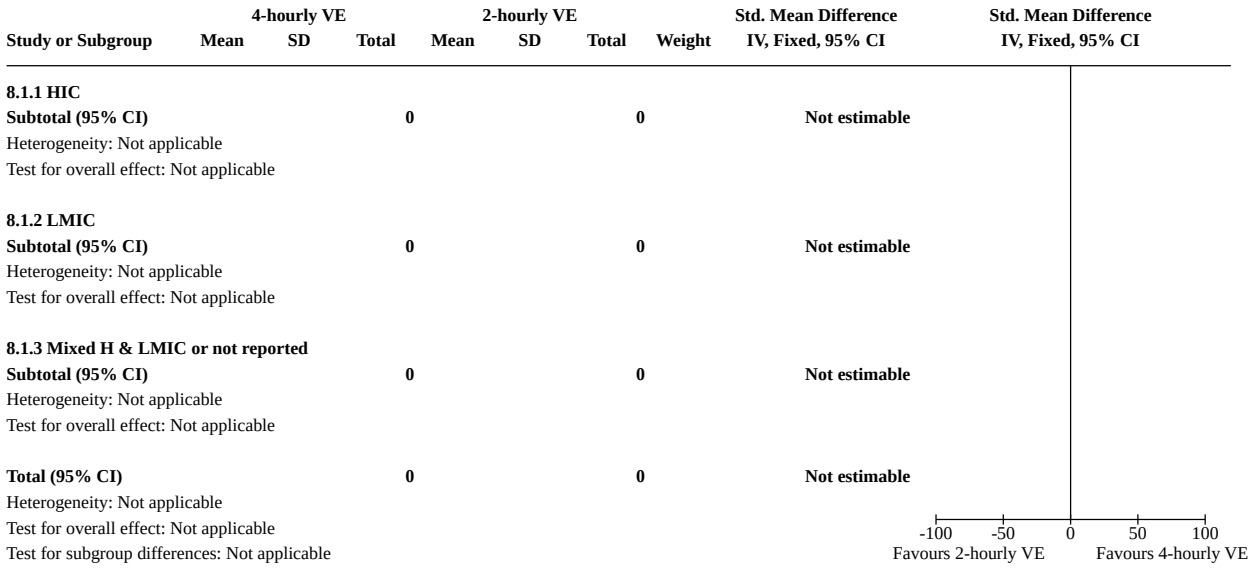
Comparison 8. Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.1.1 HIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.1.2 LMIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.1.3 Mixed H & LMIC or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.2 Augmentation of labour (primary outcome)	1	109	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.60, 1.57]
8.2.1 HIC	1	109	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.60, 1.57]
8.2.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.2.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.3 Spontaneous vaginal birth (primary outcome)	1	150	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.83, 1.26]
8.3.1 HIC	1	150	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.83, 1.26]
8.3.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.3.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.4 Chorioamnionitis (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.4.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.4.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.4.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.5 Neonatal infection (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.5.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.5.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.5.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.6 Admission to NICU (primary outcome)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.6.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.6.2 LMIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.6.3 Mixed H & LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.7 Maternal pain (primary outcome)	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

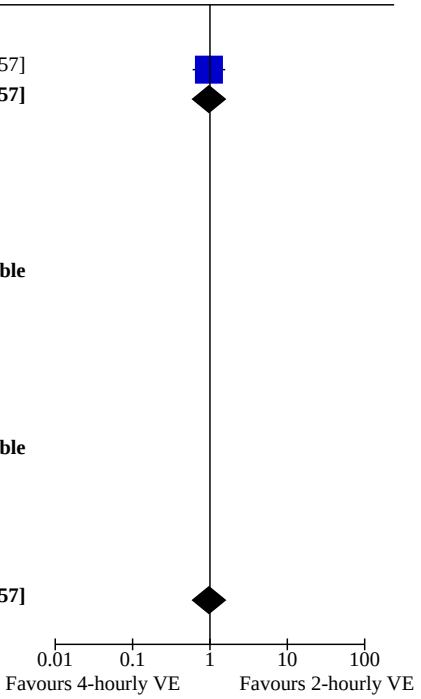
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.7.1 HIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.7.2 LMIC	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.7.3 Mixed H & LMIC or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Analysis 8.1. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 1: Positive birth experience (primary outcome)



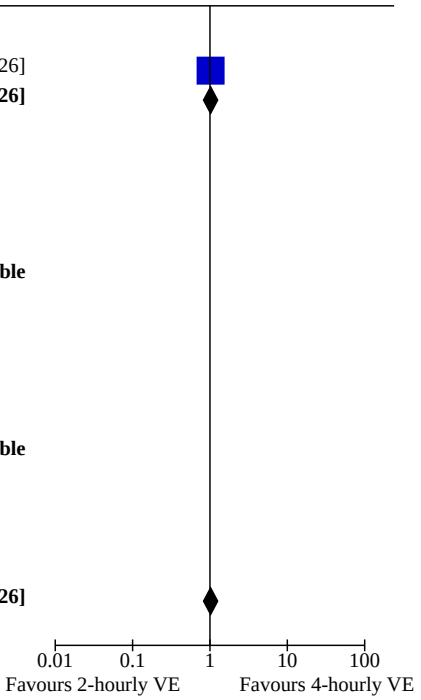
Analysis 8.2. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
8.2.1 HIC						
Abukhalil 1996	20	54	21	55	100.0%	0.97 [0.60 , 1.57]
Subtotal (95% CI)		**54**		**55**	**100.0%**	**0.97 [0.60 , 1.57]**
Total events:	20		21			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
8.2.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.2.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**54**		**55**	**100.0%**	**0.97 [0.60 , 1.57]**
Total events:	20		21			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.12 (P = 0.90)						
Test for subgroup differences: Not applicable						



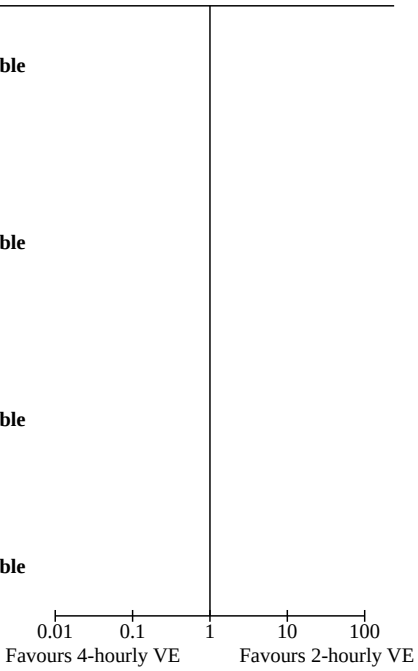
Analysis 8.3. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 3: Spontaneous vaginal birth (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
8.3.1 HIC						
Abukhalil 1996	53	75	52	75	100.0%	1.02 [0.83 , 1.26]
Subtotal (95% CI)		**75**		**75**	**100.0%**	**1.02 [0.83 , 1.26]**
Total events:	53		52			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.18 (P = 0.86)						
8.3.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.3.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**75**		**75**	**100.0%**	**1.02 [0.83 , 1.26]**
Total events:	53		52			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.18 (P = 0.86)						
Test for subgroup differences: Not applicable						



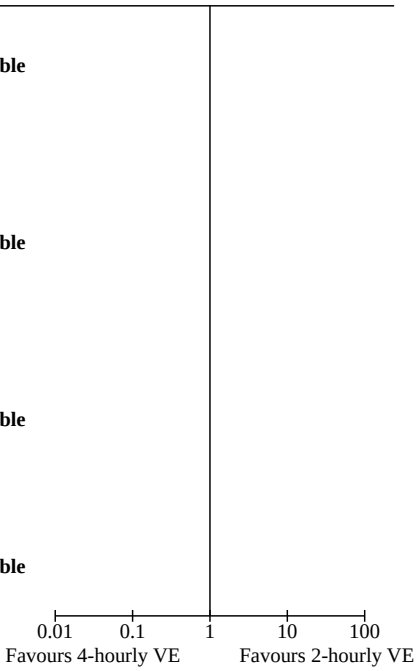
Analysis 8.4. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 4: Chorioamnionitis (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
8.4.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.4.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.4.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



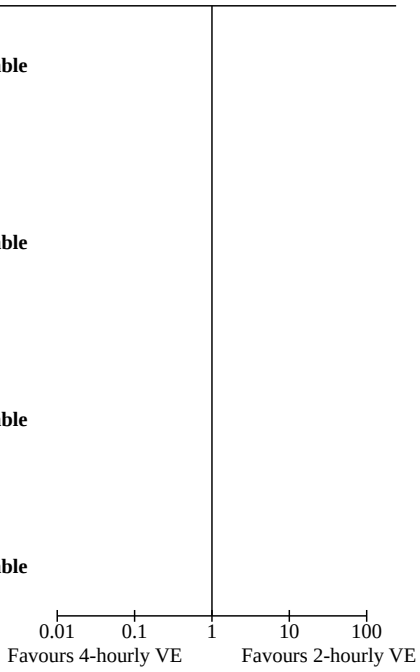
Analysis 8.5. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 5: Neonatal infection (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
8.5.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.5.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.5.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



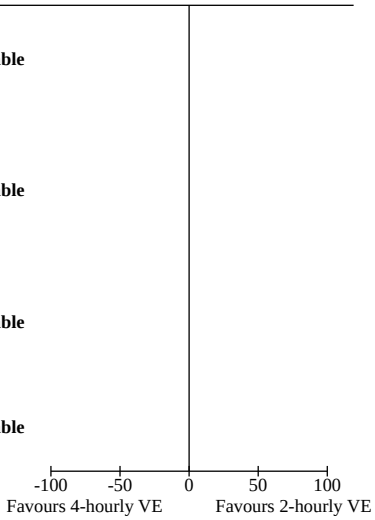
Analysis 8.6. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 6: Admission to NICU (primary outcome)

Study or Subgroup	4-hourly VE Events	4-hourly VE Total	2-hourly VE Events	2-hourly VE Total	Weight	Risk Ratio M-H, Fixed, 95% CI
8.6.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.6.2 LMIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
8.6.3 Mixed H & LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 8.7. Comparison 8: Routine vaginal examinations 4-hourly versus 2-hourly (subgroup by country income), Outcome 7: Maternal pain (primary outcome)

Study or Subgroup	4-hourly VE Mean	4-hourly VE SD	4-hourly VE Total	2-hourly VE Mean	2-hourly VE SD	2-hourly VE Total	Weight	Mean Difference IV, Fixed, 95% CI
8.7.1 HIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
8.7.2 LMIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
8.7.3 Mixed H & LMIC or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



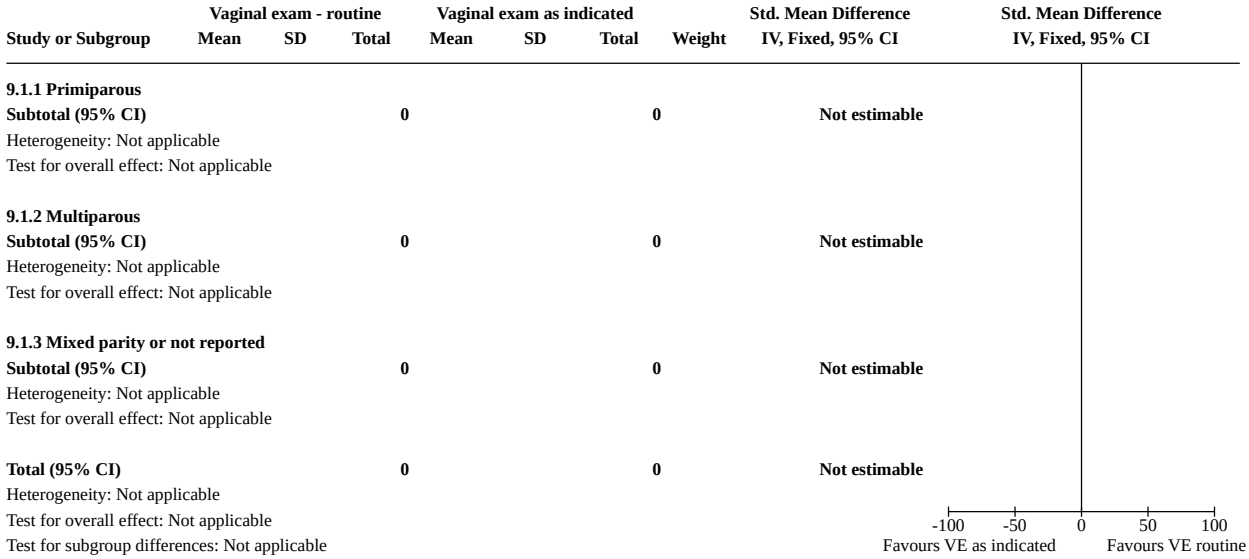
Comparison 9. Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
9.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.1.1 Primiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.1.2 Multiparous	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.1.3 Mixed parity or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Augmentation of labour (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.55 [1.03, 6.31]
9.2.1 Primiparous	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.55 [1.03, 6.31]
9.2.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.2.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.3 Spontaneous vaginal birth (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	1.08 [0.73, 1.59]
9.3.1 Primiparous	1	204	Risk Ratio (M-H, Fixed, 95% CI)	1.08 [0.73, 1.59]
9.3.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.3.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.4 Chorioamnionitis (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	3.06 [0.13, 74.21]
9.4.1 Primiparous	1	204	Risk Ratio (M-H, Fixed, 95% CI)	3.06 [0.13, 74.21]
9.4.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.4.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.5 Neonatal infection (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	4.08 [0.46, 35.87]
9.5.1 Primiparous	1	204	Risk Ratio (M-H, Fixed, 95% CI)	4.08 [0.46, 35.87]
9.5.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.5.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
9.6 Admission to NICU (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.04 [0.63, 6.56]
9.6.1 Primiparous	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.04 [0.63, 6.56]
9.6.2 Multiparous	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.6.3 Mixed parity or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.7 Maternal pain (primary outcome)	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.7.1 Primiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.7.2 Multiparous	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.7.3 Mixed parity or not reported	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.8 Physiological labour and birth	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.9 Caesarean birth	1	204	Risk Ratio (M-H, Fixed, 95% CI)	1.19 [0.88, 1.60]
9.10 Operative vaginal birth	1	204	Risk Ratio (M-H, Fixed, 95% CI)	0.63 [0.36, 1.10]
9.11 Length of labour (in hours)	1	204	Mean Difference (IV, Fixed, 95% CI)	-6.80 [-10.62, -2.98]
9.12 Epidural for pain relief	1	204	Risk Ratio (M-H, Fixed, 95% CI)	0.87 [0.54, 1.41]
9.13 Narcotics for pain relief	1	204	Risk Ratio (M-H, Fixed, 95% CI)	1.15 [0.71, 1.85]
9.14 Maternal infection	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.15 Postpartum haemorrhage (≥ 1000 mL)	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.16 Postpartum haemorrhage (≥ 500 mL)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	0.92 [0.39, 2.16]
9.17 Severe perineal damage	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.18 Maternal incontinence at 6 weeks	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.19 Breastfeeding/mixed feeding at 6 weeks postpartum	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.20 Postpartum depression/birth trauma/PTSD	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.21 Women's preference for the intervention in future	1	204	Risk Ratio (M-H, Fixed, 95% CI)	0.54 [0.44, 0.68]

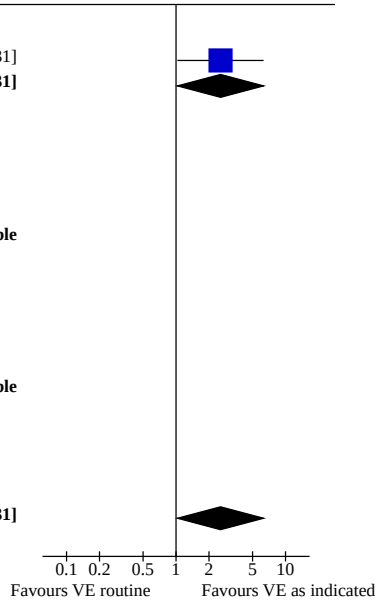
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
9.22 Maternal mortality or severe morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.23 Apgar < 7 at 5 minutes	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.04 [0.38, 10.89]
9.24 Neonatal resuscitation	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.25 Neonatal fits/seizures	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.26 Hypoxic ischaemic encephalopathy	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.27 Perinatal mortality	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.28 Severe perinatal morbidity	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.29 Maternal anxiety - not prespecified	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.30 Maternal comfort - not prespecified	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Analysis 9.1. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 1: Positive birth experience (primary outcome)



Analysis 9.2. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
9.2.1 Primiparous						
Win 2019 (1)	15	101	6	103	100.0%	2.55 [1.03 , 6.31]
Subtotal (95% CI)		**101**		**103**	**100.0%**	**2.55 [1.03 , 6.31]**
Total events:	15		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.02 (P = 0.04)						
9.2.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
9.2.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**101**		**103**	**100.0%**	**2.55 [1.03 , 6.31]**
Total events:	15		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.02 (P = 0.04)						
Test for subgroup differences: Not applicable						

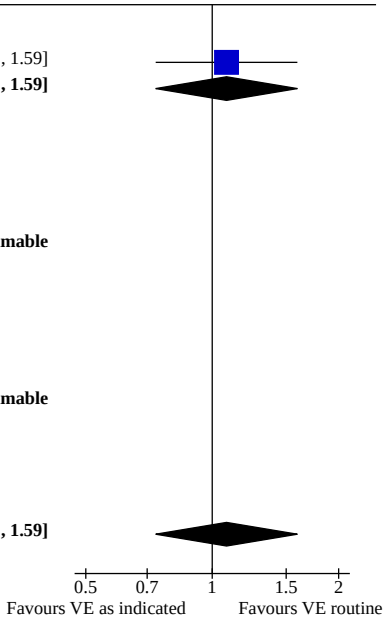


Footnotes

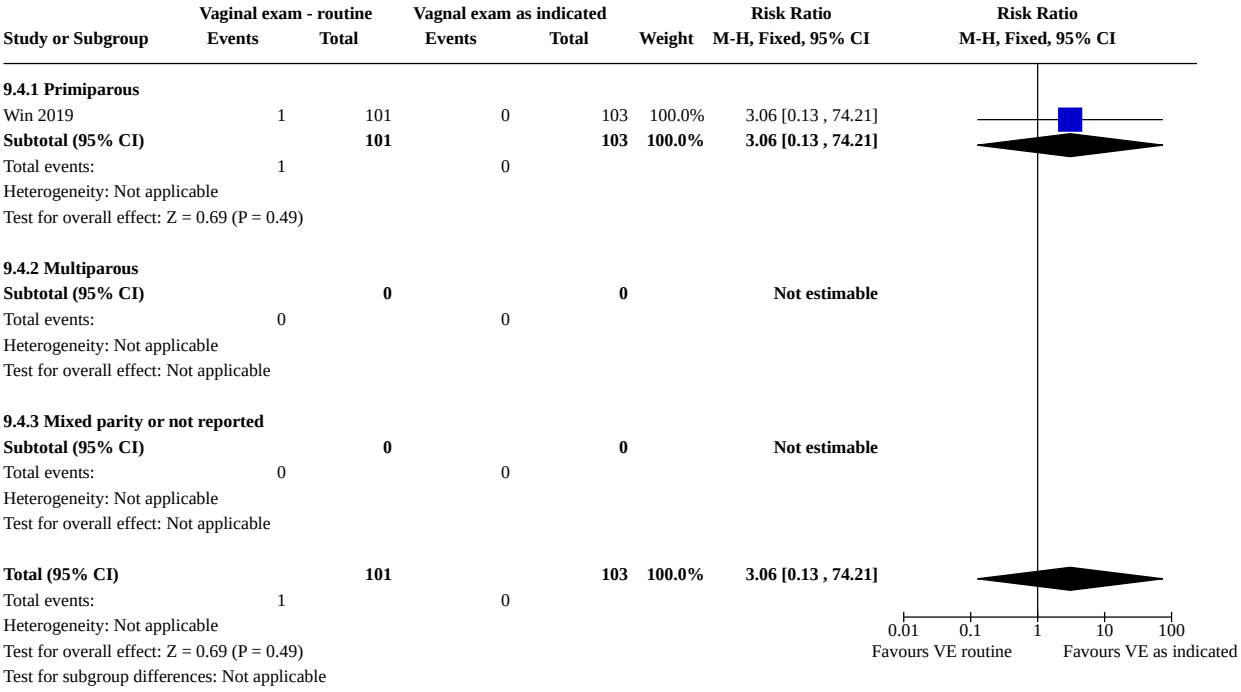
(1) Use of oxytocin during 12 hour study period

Analysis 9.3. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 3: Spontaneous vaginal birth (primary outcome)

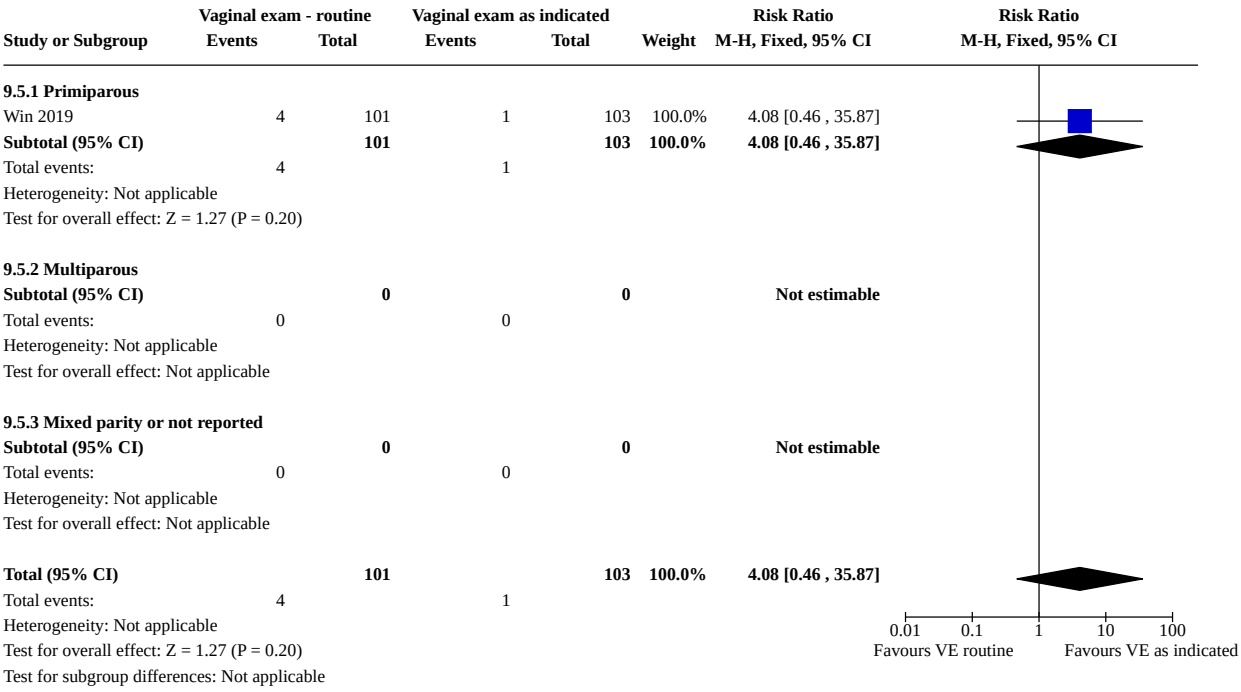
Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
9.3.1 Primiparous						
Win 2019	35	101	33	103	100.0%	1.08 [0.73 , 1.59]
Subtotal (95% CI)		**101**		**103**	**100.0%**	**1.08 [0.73 , 1.59]**
Total events:	35		33			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.40 (P = 0.69)						
9.3.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
9.3.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**101**		**103**	**100.0%**	**1.08 [0.73 , 1.59]**
Total events:	35		33			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.40 (P = 0.69)						
Test for subgroup differences: Not applicable						



Analysis 9.4. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 4: Chorioamnionitis (primary outcome)

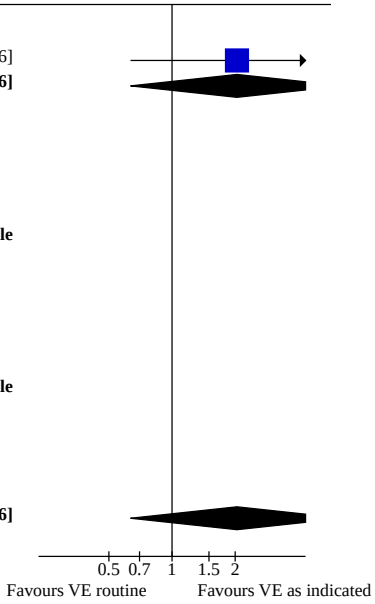


Analysis 9.5. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 5: Neonatal infection (primary outcome)



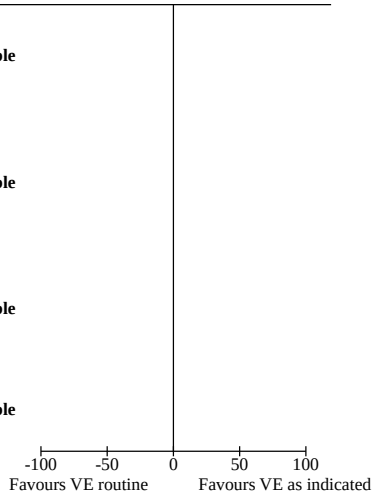
Analysis 9.6. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 6: Admission to NICU (primary outcome)

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
9.6.1 Primiparous						
Win 2019	8	101	4	103	100.0%	2.04 [0.63 , 6.56]
Subtotal (95% CI)		**101**		**103**	**100.0%**	**2.04 [0.63 , 6.56]**
Total events:	8		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.20 (P = 0.23)						
9.6.2 Multiparous						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
9.6.3 Mixed parity or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**101**		**103**	**100.0%**	**2.04 [0.63 , 6.56]**
Total events:	8		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.20 (P = 0.23)						
Test for subgroup differences: Not applicable						



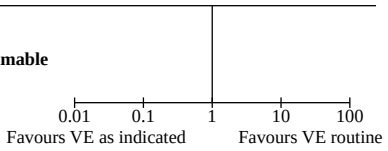
Analysis 9.7. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 7: Maternal pain (primary outcome)

Study or Subgroup	Vaginal exam - routine Mean	SD	Total	Vaginal exam as indicated Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
9.7.1 Primiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
9.7.2 Multiparous								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
9.7.3 Mixed parity or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



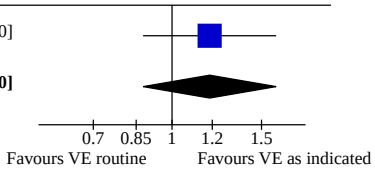
Analysis 9.8. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 8: Physiological labour and birth

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



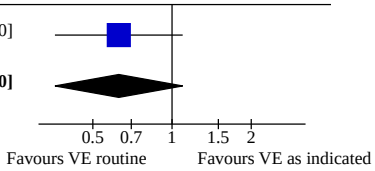
Analysis 9.9. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 9: Caesarean birth

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	50	101	43	103	100.0%	1.19 [0.88 , 1.60]
Total (95% CI)		**101**		**103**	**100.0%**	**1.19 [0.88 , 1.60]**
Total events:	50		43			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.11 (P = 0.27)						
Test for subgroup differences: Not applicable						



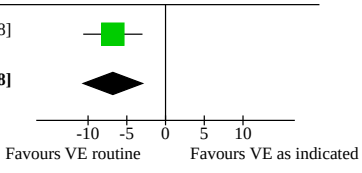
Analysis 9.10. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 10: Operative vaginal birth

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	16	101	26	103	100.0%	0.63 [0.36 , 1.10]
Total (95% CI)		**101**		**103**	**100.0%**	**0.63 [0.36 , 1.10]**
Total events:	16		26			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.63 (P = 0.10)						
Test for subgroup differences: Not applicable						



Analysis 9.11. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 11: Length of labour (in hours)

Study or Subgroup	Vaginal exam - routine Mean	SD	Total	Vaginal exam as indicated Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Win 2019 (1)	24.3	12.8	101	31.1	15	103	100.0%	-6.80 [-10.62 , -2.98]
Total (95% CI)			**101**			**103**	**100.0%**	**-6.80 [-10.62 , -2.98]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 3.49 (P = 0.0005)								
Test for subgroup differences: Not applicable								

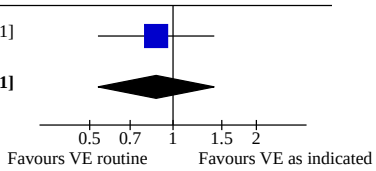


Footnotes
(1) In hours

Analysis 9.12. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 12: Epidural for pain relief

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	23	101	27	103	100.0%	0.87 [0.54 , 1.41]
Total (95% CI)		**101**		**103**	**100.0%**	**0.87 [0.54 , 1.41]**
Total events:	23		27			

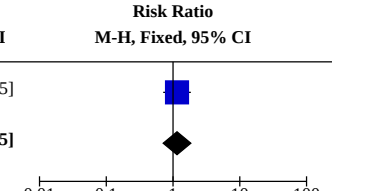
Heterogeneity: Not applicable
Test for overall effect: Z = 0.57 (P = 0.57)
Test for subgroup differences: Not applicable



Analysis 9.13. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 13: Narcotics for pain relief

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	27	101	24	103	100.0%	1.15 [0.71 , 1.85]
Total (95% CI)		**101**		**103**	**100.0%**	**1.15 [0.71 , 1.85]**
Total events:	27		24			

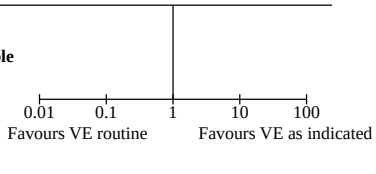
Heterogeneity: Not applicable
Test for overall effect: Z = 0.57 (P = 0.57)
Test for subgroup differences: Not applicable



Analysis 9.14. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 14: Maternal infection

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

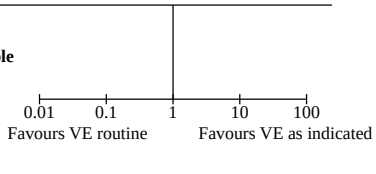
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.15. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 15: Postpartum haemorrhage (≥ 1000 mL)

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

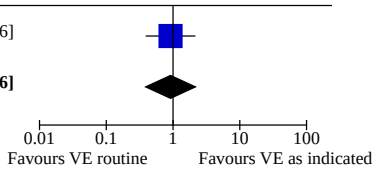
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.16. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 16: Postpartum haemorrhage (≥ 500 mL)

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	9	101	10	103	100.0%	0.92 [0.39 , 2.16]
Total (95% CI)		**101**		**103**	**100.0%**	**0.92 [0.39 , 2.16]**
Total events:	9		10			

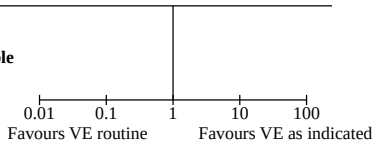
Heterogeneity: Not applicable
Test for overall effect: Z = 0.20 (P = 0.84)
Test for subgroup differences: Not applicable



Analysis 9.17. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 17: Severe perineal damage

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

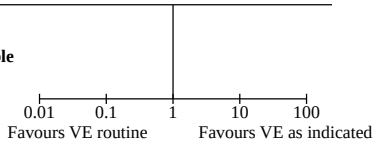
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.18. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 18: Maternal incontinence at 6 weeks

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

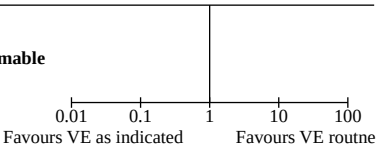
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.19. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 19: Breastfeeding/mixed feeding at 6 weeks postpartum

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

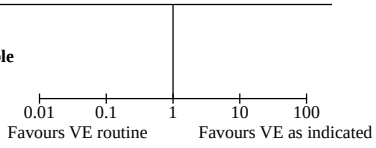
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.20. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 20: Postpartum depression/birth trauma/PTSD

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

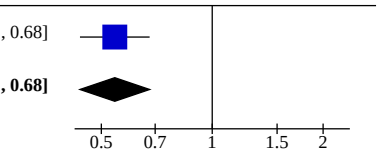
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.21. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 21: Women's preference for the intervention in future

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	48	101	90	103	100.0%	0.54 [0.44 , 0.68]
Total (95% CI)		**101**		**103**	**100.0%**	**0.54 [0.44 , 0.68]**
Total events:	48		90			

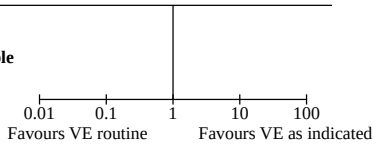
Heterogeneity: Not applicable
Test for overall effect: Z = 5.48 (P < 0.00001)
Test for subgroup differences: Not applicable



Analysis 9.22. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 22: Maternal mortality or severe morbidity

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

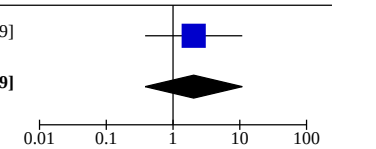
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.23. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 23: Apgar < 7 at 5 minutes

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Win 2019	4	101	2	103	100.0%	2.04 [0.38 , 10.89]
Total (95% CI)		**101**		**103**	**100.0%**	**2.04 [0.38 , 10.89]**
Total events:	4		2			

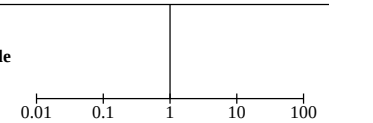
Heterogeneity: Not applicable
Test for overall effect: Z = 0.83 (P = 0.40)
Test for subgroup differences: Not applicable



Analysis 9.24. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 24: Neonatal resuscitation

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

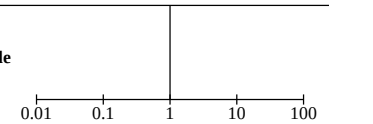
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.25. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 25: Neonatal fits/seizures

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

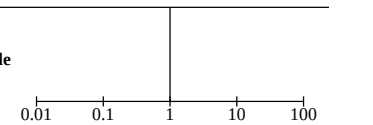
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 9.26. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 26: Hypoxic ischaemic encephalopathy

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

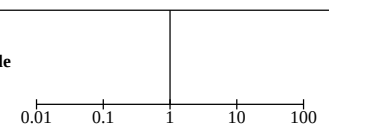
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



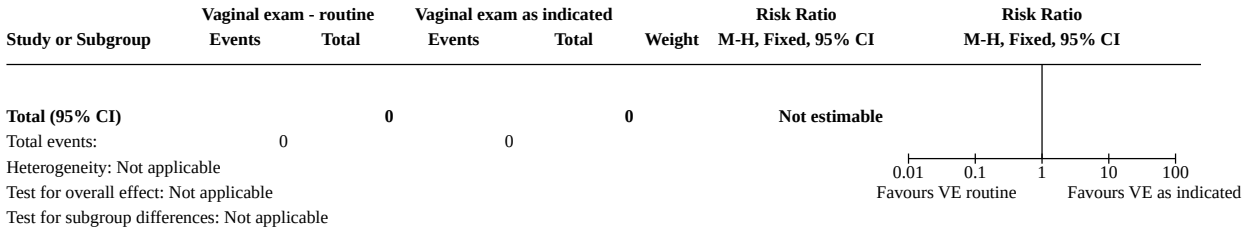
Analysis 9.27. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 27: Perinatal mortality

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

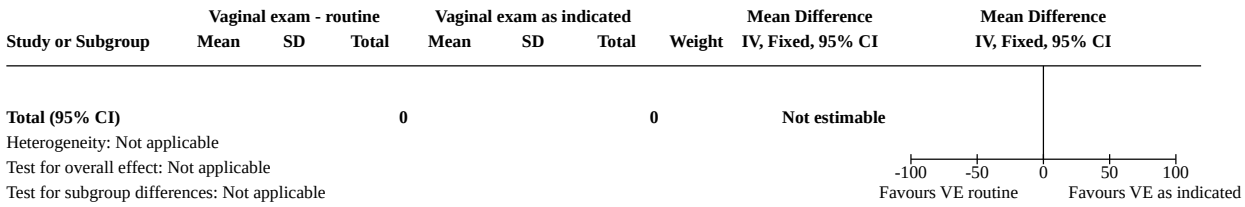
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



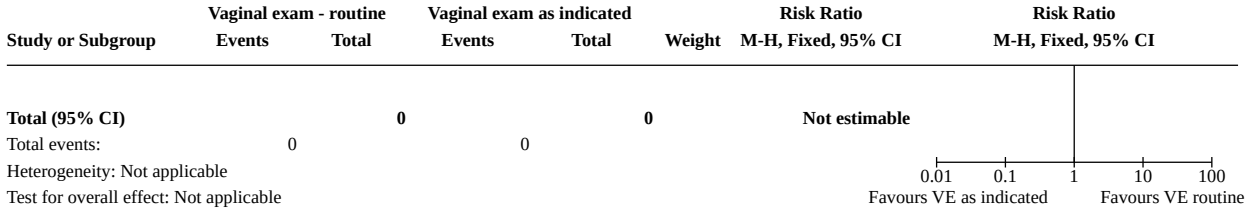
Analysis 9.28. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 28: Severe perinatal morbidity



Analysis 9.29. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 29: Maternal anxiety - not prespecified



Analysis 9.30. Comparison 9: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by parity), Outcome 30: Maternal comfort - not prespecified



Comparison 10. Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income)

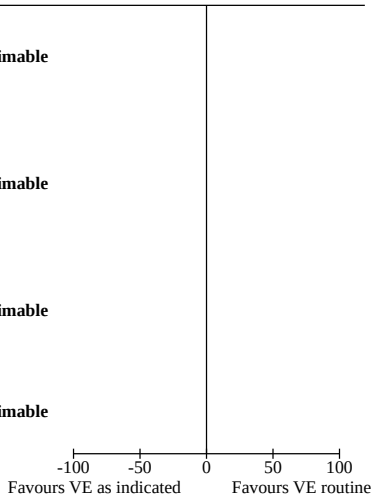
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
10.1 Positive birth experience (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.1.1 HIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.1.2 LMIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.1.3 Mixed H + LMIC or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
10.2 Augmentation of labour (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.55 [1.03, 6.31]
10.2.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.2.2 LMIC	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.55 [1.03, 6.31]
10.2.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.3 Spontaneous vaginal birth (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	1.08 [0.73, 1.59]
10.3.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.3.2 LMIC	1	204	Risk Ratio (M-H, Fixed, 95% CI)	1.08 [0.73, 1.59]
10.3.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.4 Chorioamnionitis (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	3.06 [0.13, 74.21]
10.4.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.4.2 LMIC	1	204	Risk Ratio (M-H, Fixed, 95% CI)	3.06 [0.13, 74.21]
10.4.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.5 Neonatal infection (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	4.08 [0.46, 35.87]
10.5.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.5.2 LMIC	1	204	Risk Ratio (M-H, Fixed, 95% CI)	4.08 [0.46, 35.87]
10.5.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.6 Admission to NICU (primary outcome)	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.04 [0.63, 6.56]
10.6.1 HIC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.6.2 LMIC	1	204	Risk Ratio (M-H, Fixed, 95% CI)	2.04 [0.63, 6.56]
10.6.3 Mixed H + LMIC or not reported	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.7 Maternal pain (primary outcome)	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.7.1 HIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
10.7.2 LMIC	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.7.3 Mixed H + LMIC or not reported	0	0	Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable

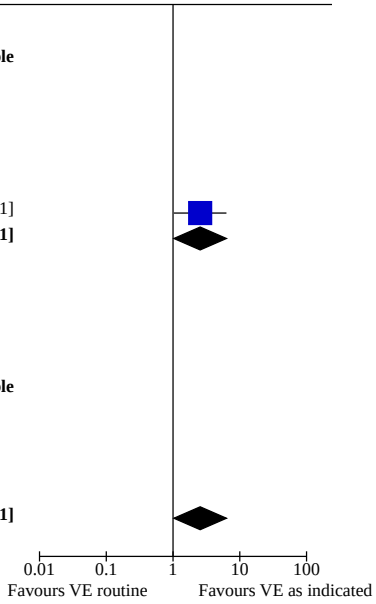
Analysis 10.1. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 1: Positive birth experience (primary outcome)

Study or Subgroup	Vaginal exam - routine Mean	SD	Total	Vaginal exam as indicated Mean	SD	Total	Weight	Std. Mean Difference IV, Fixed, 95% CI
10.1.1 HIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
10.1.2 LMIC								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
10.1.3 Mixed H + LMIC or not reported								
Subtotal (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Total (95% CI)			**0**			**0**		**Not estimable**
Heterogeneity: Not applicable								
Test for overall effect: Not applicable								
Test for subgroup differences: Not applicable								



Analysis 10.2. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 2: Augmentation of labour (primary outcome)

Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
10.2.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
10.2.2 LMIC						
Win 2019 (1)	15	101	6	103	100.0%	2.55 [1.03 , 6.31]
Subtotal (95% CI)		**101**		**103**	**100.0%**	**2.55 [1.03 , 6.31]**
Total events:	15		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.02 (P = 0.04)						
10.2.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**101**		**103**	**100.0%**	**2.55 [1.03 , 6.31]**
Total events:	15		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.02 (P = 0.04)						
Test for subgroup differences: Not applicable						

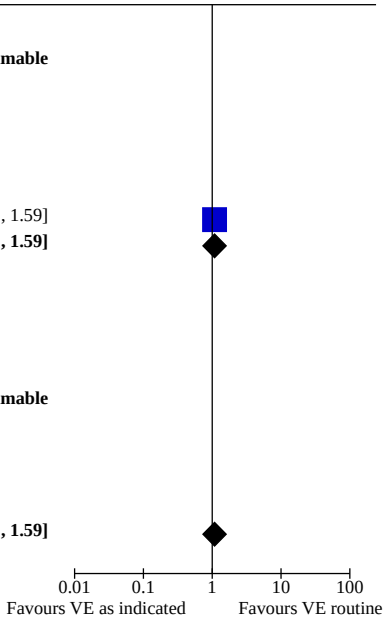


Footnotes

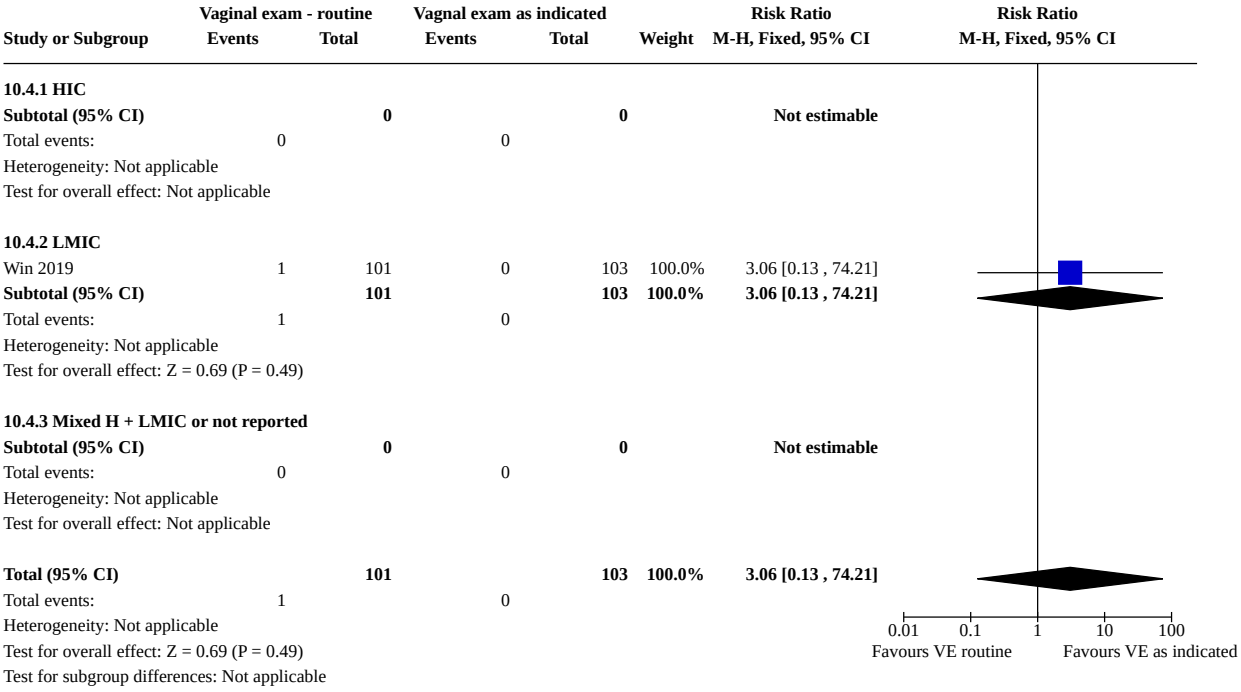
(1) Use of oxytocin during 12 hour study period

Analysis 10.3. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 3: Spontaneous vaginal birth (primary outcome)

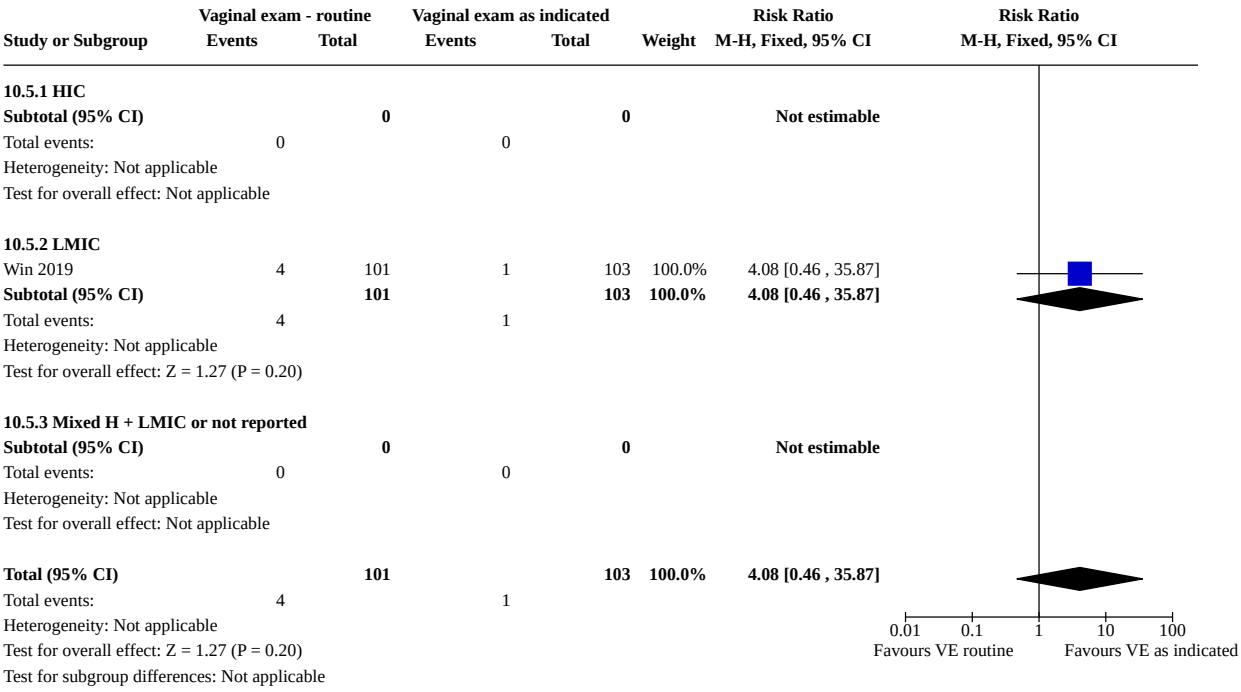
Study or Subgroup	Vaginal exam - routine Events	Total	Vaginal exam as indicated Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
10.3.1 HIC						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
10.3.2 LMIC						
Win 2019	35	101	33	103	100.0%	1.08 [0.73 , 1.59]
Subtotal (95% CI)		**101**		**103**	**100.0%**	**1.08 [0.73 , 1.59]**
Total events:	35		33			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.40 (P = 0.69)						
10.3.3 Mixed H + LMIC or not reported						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**101**		**103**	**100.0%**	**1.08 [0.73 , 1.59]**
Total events:	35		33			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.40 (P = 0.69)						
Test for subgroup differences: Not applicable						



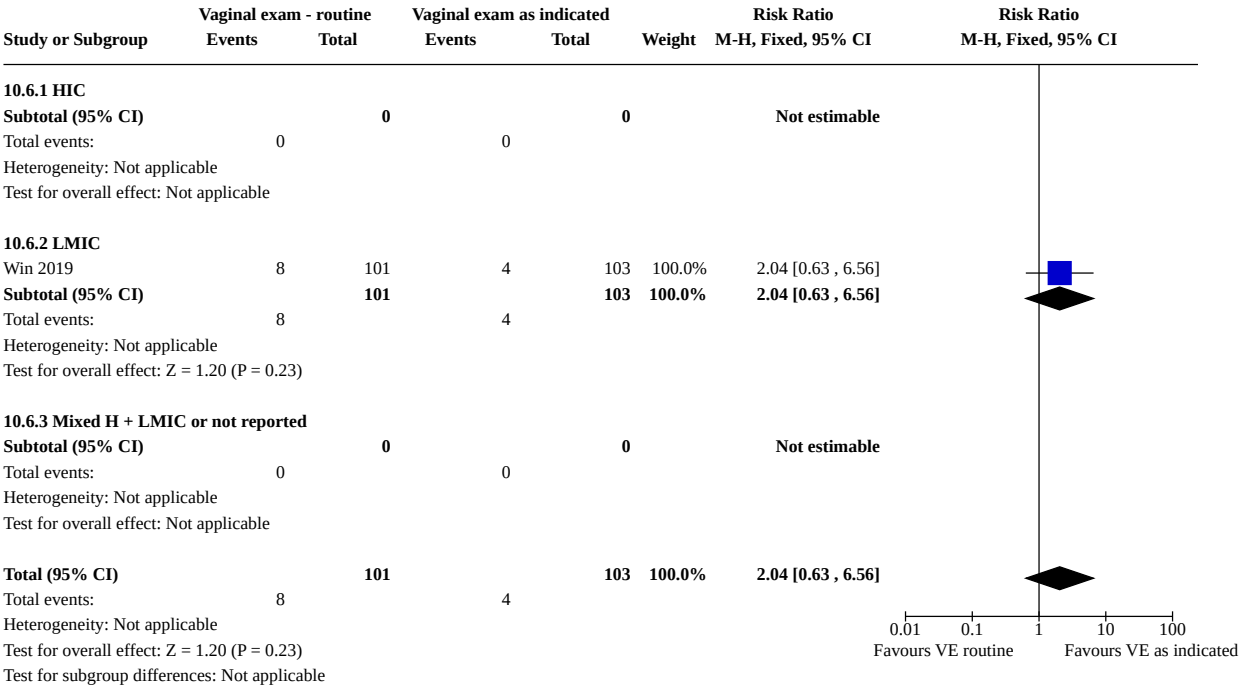
Analysis 10.4. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 4: Chorioamnionitis (primary outcome)



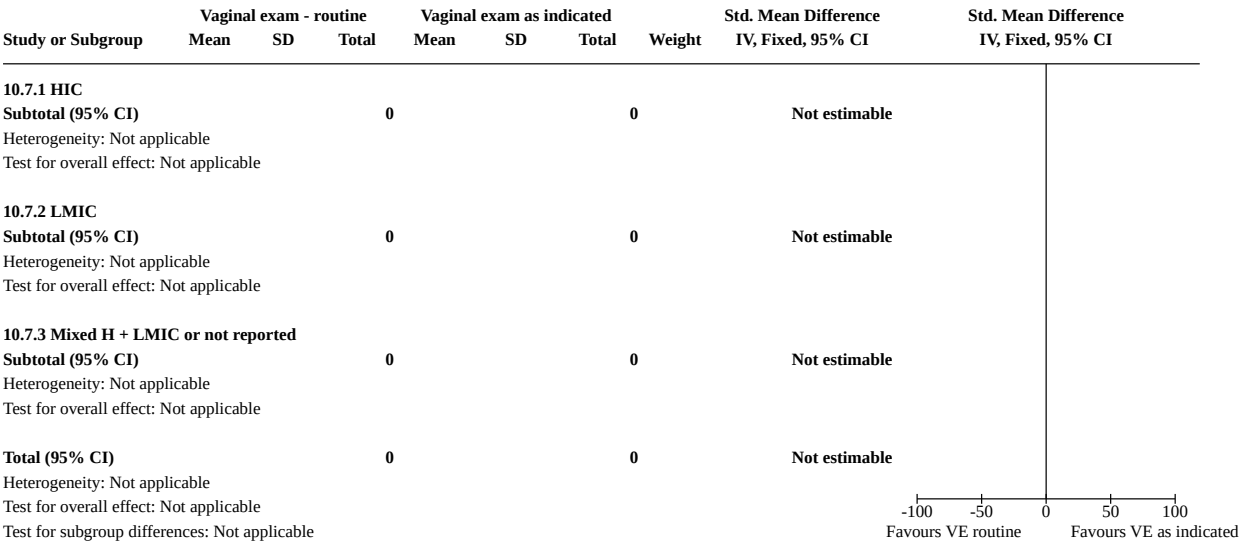
Analysis 10.5. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 5: Neonatal infection (primary outcome)



Analysis 10.6. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 6: Admission to NICU (primary outcome)



Analysis 10.7. Comparison 10: Routine vaginal examinations versus vaginal examinations as indicated (subgroup by country income), Outcome 7: Maternal pain (primary outcome)



APPENDICES

Appendix 1. Search methods for ClinicalTrials.gov

Advanced search

Interventional Studies | labor | digital examination

Interventional Studies | labor | vaginal examination

WHAT'S NEW

Date	Event	Description
28 February 2021	New citation required but conclusions have not changed	Conclusions have not changed, but we added two comparisons: 1) routine vaginal examinations versus routine ultrasound to assess progress of labour; and 2) routine vaginal examinations versus vaginal examinations as indicated.
28 February 2021	New search has been performed	For this update, we assessed 13 new full-text trial reports covering seven new studies. We included two studies already included in the 2013 review (Abukhalil 1996; Murphy 1986), and two new studies (Seval 2016; Win 2019). We excluded four new studies (Barros 2021; Martin 2021; Popowski 2015; Yaddehige 2015). One new study is ongoing (Oberman 2020).

HISTORY

Protocol first published: Issue 9, 2012
Review first published: Issue 7, 2013

CONTRIBUTIONS OF AUTHORS

SD, GG, HD, and MS wrote the original protocol; GM wrote the updated proposal with input from the review team. GM and GG undertook the main eligibility assessments. GG, HD, GT, and MS undertook data extraction. GM and GG undertook risk of bias and GRADE assessments. AC provided statistical input. SD and HD wrote the original 2013 version of the review. GM updated and drafted this version of the review, with input from GG, SD, and HD. All authors approved the final version of the review.

DECLARATIONS OF INTEREST

Gill Moncrieff: NIHR Fellowship - payment was made to my institution. I am a midwife (currently non-clinical).

Gillian ML Gyte: received royalties from John Wiley & Sons with regard to *A Cochrane Pocketbook - Pregnancy and Childbirth* (Hofmeyr and colleagues, 2008). Gill is a member of the Cochrane Pregnancy and Childbirth Editorial Board, but was not involved in the editorial process for this update.

Hannah G Dahlen: I have published on vaginal examination, and undertook the first Cochrane Review on this topic. I am a professor of Midwifery at Western Sydney University.

Gill Thomson: none known.

Mandisa Singata-Madliki: none known.

Andrew Clegg: none known.

Soo Downe: I was lead author on the previous Cochrane Review on this topic, and on two associated commentary papers. I am a practising midwife. I am not currently in active practice, but am undertaking research in intrapartum care.

SOURCES OF SUPPORT

Internal sources

- University of Central Lancashire, UK
- University of Western Sydney, Australia
- University of Liverpool, UK
- University of Fort Hare, South Africa
- University of Witwatersrand, South Africa

External sources

- New Source of support, Other

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We modified the Background to reflect changes since the previous version of this review (Downe 2013).

We have changed the comparisons to include anal cleft/purple line together with maternal behavioural cues under externally observed physical and behavioural changes, and cervical technical assessment to ultrasound.

We did not include 'no intervention' as a comparison in this review, because the previous version of this review did not identify any studies that used this comparison (Downe 2013), and we believe that current studies would likely always include a comparator intervention, even if these are simply monitoring maternal behaviour through 'watchful attendance' (de Jonge 2021).

We have implemented the Cochrane Pregnancy and Childbirth Trustworthiness Screening Tool to all studies eligible for inclusion in this update.

Where appropriate, we checked and amended risk of bias.

We used GRADE to assess the certainty of the evidence and included our assessments in summary of findings tables.

We reassessed the outcomes due to developments since the last review and following discussion amongst the review team. A comparison with the outcomes in the previous version of this review (Downe 2013) is outlined below.

Primary outcomes in the Downe 2013 review	**Primay outcomes in the 2022 update (this review)**
Length of labour	Positive birth experience
Maternal infection requiring antibiotics	Augmentation of labour
Neonatal infection requiring antibiotics	Spontaneous vaginal birth
Very positive views of intrapartum care, which is a composite outcome, defined as the highest category of rating (such as 'very satisfied'), in whatever measure was used by trial authors. If trial authors used more than one measure of women's views, the one assessing satisfaction with intrapartum care would be chosen	Chorioamnionitis
	Neonatal infection (as defined by study authors)
	Admission to neonatal intensive care unit (NICU)
	Maternal pain (as defined by study authors)
Secondary outcomes in the Downe 2013 review	**Secondary outcomes in the 2022 update (this review)**
Maternal mortality or severe morbidity (composite of ruptured uterus, haemorrhage, severe perineal damage, infection requiring antibiotics, organ failure, admission to intensive care)	Physiological labour and birth
Infant mortality or severe morbidity (composite of birth asphyxia, neonatal encephalopathy, birth trauma, infection requiring antibiotics, childhood disability, admission to intensive care)	Caesarean birth
Augmentation (rupture of membranes, or syntocinon, or both)	Operative vaginal birth
Epidural for pain relief	Length of labour (in hours)

Narcotics for pain relief	Epidural for pain relief
Mode of birth	Narcotics for pain relief
Haemorrhage (greater than 1000 mL)	Maternal infection (as defined by study authors)
Severe perineal damage	Postpartum haemorrhage (PPH) (≥ 1000 mL)
Apgar less than seven at five minutes	PPH (≥ 500 mL)
Maternal mortality	Severe perineal/vaginal trauma or anal sphincter damage
Ruptured uterus	Urinary incontinence at six weeks postnatal or beyond
Maternal organ failure	Breastfeeding/mixed feeding up to six weeks postpartum
Maternal admission to intensive care	Postnatal depression (PND) or birth trauma/post-traumatic stress disorder (PTSD)
Perinatal mortality	Women's preferences for the intervention in future
Birth asphyxia	Maternal mortality or severe morbidity
Neonatal encephalopathy	Apgar < 7 at 5 minutes
Birth trauma (e.g. fractured skull, fractured clavicle, Erbs palsy, cephalohaematoma)	Neonatal resuscitation
Admission to neonatal intensive care	Neonatal fitting/seizures
Prolonged hospital stay (as defined by trialists) for mothers	Hypoxic ischaemic encephalopathy (HIC)
Prolonged hospital stay (as defined by trialists) for infants	Perinatal mortality
Re-admission to hospital for mothers	Severe perinatal morbidity
Re-admission to hospital for infants	Maternal anxiety*
Maternal distress	Maternal comfort*
Mothers' willingness to accept the technique for future births	
Maternal incontinence after six weeks postnatal	

* During the preparation of this update, two additional outcomes of interest were identified: 'maternal anxiety' and 'maternal comfort'. Given that these were identified after our update proposal was approved and the list of outcomes agreed for this update, we have included these two additional outcomes in our review but highlight them as non-prespecified.

INDEX TERMS

Medical Subject Headings (MeSH)

Dystocia [*diagnosis]; Gynecological Examination [*methods]; Labor, Obstetric [*physiology]; Palpation [*methods]; *Pregnancy Outcome; *Term Birth; Vagina

MeSH check words

Female; Humans; Infant, Newborn; Pregnancy