UK National Screening Committee

Fetal Presentation

An evidence map to outline the volume and type of evidence related to screening for fetal presentation for the UK National Screening Committee

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The UK National Screening Committee secretariat is hosted by Public Health England.

About the UK National Screening Committee (UK NSC)

The UK NSC advises ministers and the NHS in the 4 UK countries about all aspects of population screening and supports implementation of screening programmes. Conditions are reviewed against evidence review criteria according to the UK NSC's evidence review process.

Read a complete list of UK NSC recommendations.

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Contents

Summary

This document discusses the findings of the evidence map on screening for fetal presentation in pregnant women.

Evidence maps are a way of scanning published literature to look at the volume and type of evidence in relation to a specific topic. They inform whether the evidence is sufficient to commission a more sustained analysis on the topic under consideration.

Based on the findings of this evidence map, no further work on screening for fetal presentation in pregnant women should be commissioned at the present time.

However, though limited, the current evidence appears promising. Therefore, it is recommended that the topic be added to the UK National Screening Committee (UK NSC) recommendations list, so that it can be reconsidered in 3 years' time or sooner if significant evidence should be published before this time. For example, the publication of a forthcoming Health Technology Assessment (HTA) report on universal late ultrasound screening to predict adverse outcomes in pregnancy could be the point at which consideration is needed on the further work required on this topic.

Introduction and approach

Background & Objectives

The UK National Screening Committee (UK NSC) external reviews (also known as evidence summaries or evidence reviews) are developed in keeping with the UK NSC evidence review process to ensure that each topic is addressed in the most appropriate and proportionate manner. Further information on the evidence review process can be accessed online.

The UK NSC has not previously considered screening for fetal presentation.

The proposal for screening for fetal presentation was submitted to the UK NSC during the 2019 Annual Call for Topics. The proposal suggested that all pregnant women irrespective of risk status should be screened using handheld ultrasound devices to detect fetal presentation during routine antenatal appointments at around 36 weeks' gestational age. It was proposed that the main purpose of this would be to reduce the rate of unexpected breech presentation and consequently the rate of emergency deliveries (vaginal and caesarean section), noting that approximately 4,000 emergency caesareans could be prevented per year in the UK.[1] The UK NSC agreed that, as a first step, work should be undertaken to consider the topic of screening for fetal presentation in the form of an evidence map.

In most pregnancies, babies present in a cephalic position, with their head pointing downwards. However, in 3% to 5% of pregnancies, the baby will instead present in a bottom-down position, known as breech presentation.[2] Breech presentation is the most common form of non-cephalic presentation, and fewer than 10% of breech babies will spontaneously revert to cephalic presentation before birth.[3,4]

Typically, fetal presentation in pregnant women at term is detected by abdominal palpation. The sensitivity of this to detect breech presentation varies between studies and is dependent on practitioner skill and experience.[3,5] If breech presentation is undetected before labour, pregnant women are more likely to undergo an emergency caesarean section, putting them and their baby at increased risk of adverse outcomes.[6] Other potential consequences of undiagnosed breech presentation include an increased risk of childhood disability, spinal cord injuries, and cerebral palsy.[2,7] Meanwhile, it has been suggested that using ultrasound screening to detect fetal presentation could all but eliminate undiagnosed breech presentation in nulliparous women.[3]

There are 3 possible interventions for breech presentation; which are all associated with increased risk of longer-term neonatal adverse outcomes. As one option, breech babies can be rotated before term using external cephalic version (ECV), whereby a practitioner pushes down on the mother's abdomen. Undergoing ECV at 36 weeks' gestation or later increases the likelihood of cephalic presentation at birth and decreases the risk of breech vaginal birth and emergency caesarean section, although the procedure is reported to be uncomfortable.[8] A systematic literature review (SLR) by Hutton *et al.* (2015) on 5 studies similarly reported that ECV commenced before term reduces non-cephalic presentation at birth compared with no ECV attempt. Furthermore, undergoing ECV earlier, between 34 to 35 weeks' gestation (compared with at term), may also have greater benefit in reducing the rate of breech presentation and risk of vaginal breech birth. However, this may increase a pregnant woman's risk of pre-term birth compared to ECV started at 37 weeks' gestation or later (relative risk [RR] of 1.51, 95% confidence interval [CI] 1.03 to 2.21).[9]

Should ECV be unsuccessful or declined, pregnant women with breech presentation can undergo a planned caesarean section or planned vaginal delivery. More recently, planned caesarean section has become widely used for the birth of breech babies. An SLR by Hofmeyr *et al.* (2015) included 3 studies with populations of women with breech presentation at term or during labour and assessed the effects of planned caesarean section for singleton breech presentation on pregnancy outcomes. The SLR reported an overall reduction in perinatal or neonatal death for singleton breech pregnancies delivered by planned caesarean section compared with planned vaginal delivery in a random-effects analysis of the 3 studies (RR 0.29, 95% CI 0.10 to 0.86). However, in an individual study in a setting with a high national perinatal mortality rate, the same effect was not seen (RR 0.66, 95% CI 0.35 to 1.24).[2] Relative to caesarean section, vaginal delivery of breech babies is associated with an increased risk of birth complications and trauma, including oxygen deprivation and distress, head entrapment and spinal cord injuries. In addition, owing to the increased use of planned caesarean section, the skills and experience required for vaginal breech birth are becoming rarer amongst birth practitioners.[2,4] However, planned caesarean section is itself not without risk; Hofmeyr *et al.* (2015) also reported a modest increase in short-term maternal morbidity in women who underwent planned caesarean (RR 1.29, 95% CI 1.03 to 1.61), and the procedure may put future pregnancies at risk of complications.[2,10] Additionally, medical problems were increased in a subset of infants from one study with 2-year follow-up who were born via planned caesarean section (RR 1.41, 95% CI 1.05 to 1.89).[2]

Certain factors other than the birth method itself can contribute to the increased neonatal risk associated with breech birth. Care during labour and the skill of birth practitioners can also affect breech birth outcomes. Interpreting studies comparing vaginal delivery with cephalic birth can be difficult in that pre-existing vulnerabilities in pregnant women (such as nulliparity, uterine abnormalities, contracted pelvis and impaired fetal growth)

as well as the effects of the delivery itself, contribute to the increased overall risk of breech presentation.[2]

Three clinical guidelines concerning the management of breech presentation in the UK have been published recently. The National Institute for Health and Care Excellence (NICE) published the updated 'Antenatal care for uncomplicated pregnancies' guideline [CG62] in 2019. This recommends that fetal presentation should be assessed by fetal palpation during routine antenatal appointments at 36 weeks' gestation or later, with suspected breech presentation being confirmed using ultrasound assessment.[11]

For pregnant women with breech presentation at term, guidelines by the Royal College of Obstetricians and Gynaecologists (RCOG) published in 2017 recommend that an ECV should be offered unless an absolute contraindication exists. RCOG recommends that pregnant women with breech presentation should be counselled on the risks of vaginal breech birth versus planned caesarean section following an unsuccessful, or declined, ECV.[12]

The NICE guideline 'Intrapartum care for women with existing medical conditions or obstetric complications and their babies' guideline [NG121] covers the scenario of pregnant women presenting with breech presentation in labour. It is recommended that healthcare professionals discuss the possible benefits and risks of a vaginal birth and caesarean section both to themselves and their baby. The guidance also recommends that pregnant women with breech presentation in labour should be given the choice between continuing labour and caesarean section, and that the potential greater benefit in early labour of having a caesarean section should be explained.[13]

Two recent publications have discussed the need for strategies such as screening to increase the detection of breech presentation in pregnant women, alongside performing sufficient antenatal risk assessment, and have both suggested ultrasound screening at ~36 weeks' gestation as an option.[14,15] Notably, a 2006 cross-sectional study that examined the sensitivity of clinical examination in detecting non-cephalic presentation in pregnant women used point-of-care ultrasound (POCUS) scanning as the reference standard, suggesting that ultrasound has a higher detection rate for breech presentation than palpation.[5] Retrospective studies have found that the proportion of breech babies born via planned caesarean section due to breech presentation in some European countries has increased since the publication of the Term Breech Trial, a trial undertaken in Denmark which found a lower risk of serious neonatal morbidity following planned caesarean section versus planned vaginal birth.[16,17] This indicates the potential benefit that improved detection of breech presentation before labour could confer. The publication of a forthcoming Health Technology Assessment (HTA) report on universal late ultrasound screening to predict adverse outcomes in pregnancy is expected to provide useful results on this topic.

Aims of the evidence map

Evidence maps are rapid evidence products which aim to gauge the volume and type of evidence relating to a specific topic.

This evidence map has been developed to assess whether a more sustained review on screening for fetal presentation should be commissioned and to evaluate the volume and type of evidence on key issues related to screening for fetal presentation.

The aim was to address the following questions:

> **Q1:** What is the diagnostic accuracy of an ultrasound scan performed at point of care (for example using handheld scanners) at 36 weeks' gestation to detect fetal presentation?
> **Q2:** What is the effectiveness of ultrasound screening in preventing emergency caesarean section and adverse maternal and neonatal outcomes?

This evidence map will focus on studies reporting outcomes relating to the diagnostic accuracy of POCUS in screening for breech presentation compared to a reference standard. Studies reporting risk of maternal and neonatal morbidity and mortality where breech presentation has been detected by ultrasound will also be summarised. Other outcomes including, but not limited to, vaginal breech births and emergency caesarean sections prevented, will be discussed.

The findings of this evidence map will provide the basis for discussion to support decision making on whether there is sufficient evidence to justify commissioning a more sustained review of the evidence on fetal presentation.

The aim of this document is to present the information necessary for the UK NSC to decide this.

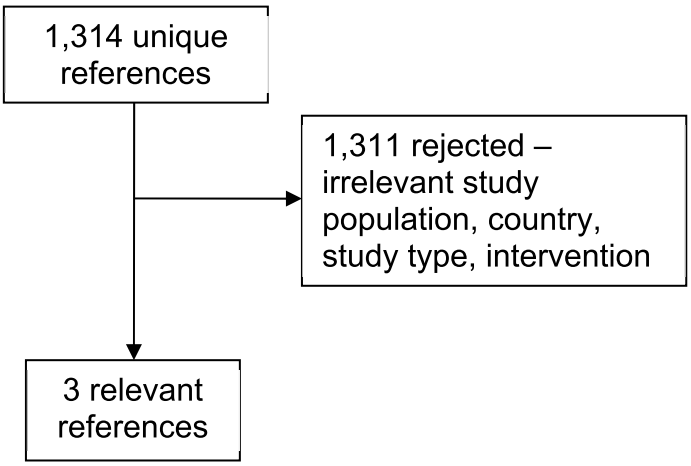
Search methods and results

The searches were conducted on 2 October 2020 on 3 databases: Medline, Embase and the Cochrane Library. The search period was restricted to 1 January 2010 to 2 October 2020. Medline and Embase were searched simultaneously via the Ovid SP platform. The Cochrane Library databases were searched via the Wiley Online platform.

The detailed search strategies, including exclusion and inclusion criteria are available in Table 2: Eligibility criteria for Question 2
. One reviewer screened all titles and abstracts. All references were reviewed at abstract level, though in some cases full texts were reviewed to clarify uncertain pieces of information. A formal quality appraisal of the evidence was not required, given the remit of the evidence map.

The search returned 1,591 results across Medline, Embase and the Cochrane Library. After automatic and manual de-duplication, 1,314 unique references were reviewed for relevance to the question/questions and 3 references were included in the final evidence map. A flow diagram summarising the number of studies included and excluded is presented in Figure 1. Abstract reporting tables are available in Appendix 2**.**

Figure 1: Summary of included and excluded publications



Two SLRs, one on the topic of planned caesarean section for breech presentation (Hofmeyr *et al.*, 2015) and one on the topic of ECV for breech presentation (Hutton *et al.,* 2015) were not identified in the database searches for this evidence map as they did not include terms for ultrasound AND screening in the title or abstract. Furthermore, even if the SLRs had been identified, they would not have met the inclusion criteria based on the current eligibility criteria for question 2 (Table 2) as while the included studies considered populations of pregnant

women with breech presentation, this was not identified via POCUS screening at or around 36 weeks' gestation.

Summary of findings

The searches and screening of articles against the inclusion criteria were conducted for both questions in parallel. The majority of the 1,314 unique identified studies failed to meet the eligibility criteria. The most common reason for this for question 1 was studies not investigating screening for breech presentation. The most common reason for question 2 was studies not including a population of women with breech presentation that had been identified by POCUS. Two studies were judged as highly relevant to one question based on the abstract alone. A further 16 studies were deemed potentially eligible and the full texts were reviewed to ascertain their relevance. The main reason for reviewing full texts was to confirm whether breech presentation was screened for or identified by POCUS that was conducted at around 36 weeks (35 to 37 weeks). Of the 16 studies checked, 15 were excluded. In total, 3 studies were included as being relevant to at least one evidence map question.

Q1: What is the diagnostic accuracy of an ultrasound scan performed at point of care (for example using handheld scanners) at 36 weeks' gestation to detect fetal presentation?

All identified studies failed to meet the eligibility criteria for this question. However, a study by Nassar *et al.* (2006), which was not identified in this evidence map as it was published prior to 2010, used POCUS as the reference standard rather than the index test. A portable handheld ultrasound device was used to confirm diagnosis of breech presentation if this was suspected following clinical examination (the index test).[5] Such use of ultrasonography as a reference standard may suggest that the diagnostic accuracy of POCUS screening is expected to be high.

> In the search period covered in this evidence map no studies on the diagnostic accuracy of a POCUS scan performed at 36 weeks' gestation to detect fetal presentation were identified. It is not clear whether the accuracy of this test was established in studies published prior to the search dates.

Q2: What is the effectiveness of ultrasound screening in preventing emergency caesarean section and adverse maternal and neonatal outcomes?

Three studies were relevant for understanding the effectiveness of ultrasound screening in preventing adverse outcomes. One of the included studies was an SLR conducted by

the Cochrane Collaboration investigating the effects of routine late pregnancy ultrasound (>24 weeks) compared against “no or selective ultrasound, or ultrasound with concealed results” on obstetric practice and pregnancy outcomes. The SLR included randomised controlled trials (RCTs) identified from the Cochrane Pregnancy and Childbirth Group's Trials Register. The authors’ stated rationale for screening was the detection of high-risk clinical conditions that would otherwise be undetected that could include, but was not exclusive to, breech presentation.[19] Only 2 out of 13 studies investigated ultrasound screening for breech presentation at 36 weeks' gestation. As such, the relevance of this SLR to address question 2 in relation to breech is limited. The other 2 included articles were primary studies, and were both conducted in the UK. Wastlund *et al*. (2019) was a prospective cohort study and cost-effectiveness analysis that investigated the cost-effectiveness of universal ultrasound scanning for breech presentation at 36 weeks’ gestation.[3] De Castro *et al.* (2020) was a retrospective study on routinely collected data, which aimed to determine the incidence of non-cephalic presentation by ultrasound at 35+0 to 36+6 weeks’ gestation and the subsequent management of these pregnancies.[20]

Wastlund *et al*. compared groups of pregnant women with clinically indicated ultrasound to those without. Details on what constituted 'clinically indicated' were not provided in the abstract. The SLR assessed outcomes in routinely screened pregnant women versus unscreened pregnant women. Meanwhile, De Castro *et al*. did not include a comparator group, focusing only on women identified as having breech or transverse/oblique presentation during the ultrasound scan.

The main outcomes measured in the SLR were perinatal mortality, preterm birth less than 37 weeks, induction of labour, caesarean section, preterm birth less than 34 weeks, maternal psychological effects and neurodevelopment at age 2. Based on their included studies, the authors found sufficient evidence to show no association between ultrasound in late pregnancy and perinatal mortality, preterm birth less than 37 weeks, induction of labour or caesarean section. However, insufficient evidence was found to detect an association for preterm birth less than 34 weeks, maternal psychological effects and neurodevelopment at age 2. It should be noted that the ultrasound was not only screening for breech presentation but other high-risk clinical conditions, including fetuses being small or large for gestational age, placenta previa, and craniospinal, gastrointestinal, urinary tract and skeletal fetal abnormalities. As such, the outcome results are likely influenced by a number of factors and not only breech presentation, and therefore their relevance to this evidence map is limited.

The 2 primary studies focused on the screening (but did not report diagnostic accuracy outcomes) and subsequent management of breech pregnancies. Wastlund *et al*. measured the likelihood of different modes of birth (elective caesarean section and emergency caesarean section) and compared the associated long-term health outcomes

for universal ultrasound to current practice. They also estimated the number of breech pregnancies that would be identified annually through late pregnancy ultrasound, that would otherwise remain undiagnosed. The authors found that routine late pregnancy screening would practically eliminate undiagnosed breech presentation, reduce fetal mortality and was a potentially cost-effective intervention. De Castro *et al*. reported on the incidence of breech presentation in order to highlight how late-pregnancy ultrasound can mitigate the problem of previously undetected breech presentation.

The 2 primary studies concluded that routine ultrasound at late stage gestation can improve outcomes for mothers and their babies with breech presentation. On the other hand, the SLR found little evidence that this intervention confers any benefit for this patient group. However, it is important to note that the results from the SLR are of limited relevance since only 2 studies included breech presentation as an indication and results are not reported separately for this and other conditions. Furthermore, there was insufficient evidence to determine whether there is an association between ultrasound and preterm birth less than 34 weeks, maternal psychological effects or neurodevelopment at age 2.

Overall, despite the strong evidence from the 2 primary studies, the direct evidence base for the effectiveness of routine ultrasound for improving outcomes associated with breech presentation is currently limited in volume (one SLR and 2 primary studies). Furthermore, studies reported on various adverse outcomes and consistency of reporting was somewhat lacking – for example, only one study explored the outcome of emergency caesarean section. One study did not include a comparator which means conclusions could not be drawn between screened and unscreened pregnant women.

Conclusions

The findings of this evidence map reveal that there is currently no evidence on the diagnostic accuracy of ultrasound scan performed at point of care (for example using handheld scanners) carried out at 36 weeks' gestation in a UK or closely-related setting. Additionally, there is limited evidence on the effectiveness of the intervention in preventing emergency caesarean section and adverse neonatal and maternal outcomes due to the small direct evidence base at the present time.

Recommendations

On the basis of this evidence map, the volume and type of direct evidence related to ultrasound screening for breech presentation at 36 weeks' gestation is currently insufficient to justify a rapid evidence review at this stage. However, though limited, the current evidence appears promising. In addition, 2 less direct Cochrane systematic reviews (Hofmeyer 2015 and Hutton 2015) report that there is benefit from interventions for breech presentation. Therefore, it is recommended that the topic be added to the UK NSC recommendations list, so that it can be reconsidered in 3 years’ time or sooner if significant evidence should be published before this time. For example, the publication of a forthcoming Health Technology Assessment (HTA) report on universal late ultrasound screening to predict adverse outcomes in pregnancy could be the point at which consideration is needed on the further work required on this topic.

Appendix 1 — Search strategy for the evidence map

SOURCES SEARCHED: Ovid MEDLINE® In-Process & Other Non-Indexed Citations, Daily and Epub Ahead of Print, Ovid MEDLINE® and Versions 1946 to 1 October 2020, Embase® 1974 to 1 October 2020, and the Cochrane Library (Issue 10 of 12, October 2020).

DATES OF SEARCH: 1 January 2010 to 1 October 2020 for MEDLINE® and Embase®; 1 January 2010 to 2 October 2020 for the Cochrane Library (searches were run on 01 October 2020 for MEDLINE® and Embase® and 02 October 2020 for the Cochrane Library).

SEARCH STRATEGIES:

MEDLINE and Embase (searched simultaneously via the Ovid SP platform)
1. exp Breech Presentation/ or *Labor Presentation/ or *Pregnancy/ 2. (breech$ or non-cephalic or non cephalic or cephalic).ti,ab,kw,kf. 3. ((labour or labor or fetal or foetal) adj3 present$).ti,ab,kw,kf. 4. or/1-3 5. screening/ or mass screening/ or (screen$ or detect$ or predict$ or identif$ or diagnos$).ti,ab. 6. "sensitivity and specificity"/ or (sensitiv$ or specific$ or accura$ or precis$ or detection rate$ or predictive value$ or likelihood ratio$ or false positive$ or false negative$ or receiver operating characteristic$ or ROC curve$ or AUROC).ti,ab. 7. Ultrasonography/ or echography/ 8. (ultrasound$ or ultrasonog$ or echograph$).ti,ab,kw,kf. 9. (5 or 6) and (7 or 8) 10. randomized controlled trials as topic/ 11. randomized controlled trial/ 12. random allocation/ 13. double blind method/ 14. single blind method/ 15. clinical trial/ 16. clinical trial, phase i.pt. 17. clinical trial, phase ii.pt. 18. clinical trial, phase iii.pt. 19. clinical trial, phase iv.pt. 20. controlled clinical trial.pt. 21. randomized controlled trial.pt. 22. multicenter study.pt. 23. clinical trial.pt. 24. exp clinical trials as topic/

25. controlled clinical trial/
26. multicenter study/
27. exp randomization/
28. single blind procedure/
29. double blind procedure/
30. crossover procedure/
31. placebo/
32. phase 1 clinical trial/ or phase 2 clinical trial/ or phase 3 clinical trial/ or phase 4 clinical trial/
33. (clinical adj trial$).ti,ab,kw,kf.
34. ((singl$ or doubl$ or treb$ or tripl$) adj (blind$3 or mask$3)).ti,ab,kw,kf.
35. placebos/
36. placebo$.ti,ab,kw,kf.
37. (allocat$ adj2 random$).ti,ab,kw,kf.
38. (Randomi?ed adj2 trial$).ti,ab,kw,kf.
39. rct.ti,ab,kw,kf.
40. or/10-39
41. exp Epidemiologic studies/
42. exp case control studies/
43. exp Cohort Studies/
44. Case control.ti,ab,kw,kf.
45. (cohort adj (study or studies)).ti,ab,kw,kf.
46. cohort analy$.ti,ab,kw,kf.
47. (follow up adj (study or studies)).ti,ab,kw,kf.
48. (observational adj (study or studies)).ti,ab,kw,kf.
49. Longitudinal$.ti,ab,kw,kf.
50. retrospective$.ti,ab,kw,kf.
51. Cross sectional.ti,ab,kw,kf.
52. Cross-sectional studies/
53. exp Longitudinal Studies/
54. exp Follow-Up Studies/
55. exp Prospective Studies/
56. exp Retrospective Studies/
57. exp Observational Studies/
58. (Prospective adj (study or studies)).ti,ab,kw,kf.
59. (evaluation adj (study or studies)).ti,ab,kw,kf.
60. (epidemiologic adj (study or studies)).ti,ab,kw,kf.
61. ((single arm or single-arm) adj3 (study or studies or trial$)).ti,ab,kw,kf.
62. (Open-label adj (trial$ or stud$)).ti,ab,kw,kf.
63. Non-blinded stud$.ti,ab,kw,kf.
64. (chart adj3 review).ti,ab,kw,kf.
65. or/41-64
66. ("Conference Abstract" or "Conference Review" or comment or editorial or note or case reports or news or news release).pt.
67. exp animals/ not exp humans/
68. (comment or editorial).pt.
69. historical article/

70. or/66-69
71. 4 and 9 and (40 or 65)
72. 71 not 70
73. limit 72 to yr=2010-current
74. remove duplicates from 73

Cochrane Library (searched via the Wiley Online platform)

1. [mh "Breech Presentation"] or [mh "Labor Presentation"] or [mh Pregnancy]
2. (breech* or "non-cephalic" or "non cephalic" or cephalic):ti,ab,kw
3. ((labour or labor or fetal or foetal) NEAR/3 present*):ti,ab,kw
4. {or #1-#3}
5. [mh "Mass Screening"] or (screen* or detect* or predict* or identif* or diagnos*):ti,ab
6. [mh "sensitivity and specificity"] or (sensitive* or specific* or accura* or precis* or detection NEXT rate* or predictive NEXT value* or likelihood NEXT ratio* or false NEXT positive* or "receiver operating" NEXT characteristic* or ROC NEXT curve* or AUROC):ti,ab
7. [mh Ultrasonography]
8. (ultrasound* or ultrasonog$ or echograph$):ti,ab,kw
9. (#5 and #6) and (#7 or #8)
10. #4 and #9
11. #10 with Cochrane Library publication date Between Jan 2010 and Oct 2020, in Cochrane Reviews, Cochrane Protocols
12. #10 with Cochrane Library publication date Between Jan 2010 and Oct 2020, in Trials

Results by database

MEDLINE and Embase	1,462
Cochrane Library	129
Total	1,591

Inclusions and exclusions

Studies were included based on the eligibility criteria listed in Table 1 and Table 2 for question 1 and question 2, respectively.

Table 1: Eligibility criteria for Question 1

PICOS domain	Inclusion Criteria	Exclusion Criteria
Patient population	All pregnant women	People who are not pregnant
Intervention	**Index test:** • POCUS scan at 36 weeks' gestation (or at a satisfactorily close timepoint to 36 weeks such as 35 to 37 weeks) **Reference standard:** • Diagnostic scan by specially trained individual using a standard clinical ultrasound system • Fetal presentation at term • Any reference standard as described in the study	**Index test:** • Any other index test **Reference standard:** N/A
Comparator	Any or none	N/A
Outcomes	Outcomes relating to diagnostic accuracy, including but not limited to: • Sensitivity • Specificity • PPV • NPV • LR • AUC	Outcomes not relevant to diagnostic accuracy
Study design	**Tier 1:** • RCTs • Non-randomised studies with consecutively enrolled populations (for example, prospective and retrospective cohort studies) • SLR/(N)MAs of these study designs **Tier 2:** • Case-control studies • Cross-sectional studies • Case series • SLR/(N)MAs of these study designs	Any other study design, including: • Case reports • Narrative reviews • Editorials • Commentaries • Conference abstracts Other publication types that have not been peer-reviewed

PICOS domain	Inclusion Criteria	Exclusion Criteria
Setting	**Tier 1:** • Studies conducted in the UK **Tier 2:** • Studies conducted in high-income countries where the population, screening methods and technology are expected to be similar to that of the UK (OECD and EEA countries excluding South Korea and Mexico)	• Studies in ineligible countries, or international studies where outcomes for eligible countries are not presented separately to outcomes from ineligible countries
Other considerations	• Articles published in the English language • Articles published since 2010	• Studies with abstract not in the English language • Articles published pre-2010

Abbreviations: AUC, area under the curve; EEA, European Economic Area; LR, likelihood ratio; N/A, not applicable; (N)MA, (network) meta-analysis; NPV, negative predictive value; OECD, Organisation for Economic Co-ordination and Development; PICOS, population-intervention-comparator-outcome-study design; POCUS, point-of-care ultrasound; PPV, positive predictive value; RCT, randomised controlled trial; SLR, systematic literature review

Table 2: Eligibility criteria for Question 2

PICOS domain	Inclusion Criteria	Exclusion Criteria
Patient population	• Pregnant women identified as having a baby with breech presentation via POCUS screening • Their babies	• People who are not pregnant • Pregnant women with cephalic presentation
Intervention	Point of care ultrasound scan at 36 weeks' gestation (or at a satisfactorily close timepoint to 36 weeks such as 35 to 37 weeks)	Any other intervention
Comparator	Any or none (for example, screening via clinical examination)	N/A
Outcomes	Risk of adverse neonatal outcomes, including but not limited to: • Birth weight (for example, centile, centile category) • Neonatal mortality and morbidity (for example, seizures, birth asphyxia, neonatal encephalopathy, birth trauma, disability in childhood • Gestational age (weeks) Risk of adverse maternal outcomes, including but not limited to: • Maternal mortality and morbidity (for example, admission to intensive care unit, septicaemia, organ failure, wound infection, infertility) • Psychological effects (for example, stress, anxiety, depression, quality of life, satisfaction) Other outcomes, including but not limited to: • Emergency caesarean sections prevented, vaginal breech births prevented, stillbirths	N/A
Study design	**Tier 1:** RCTs; non-randomised studies with consecutively enrolled populations (such as prospective	Any other study design, including: • Case reports • Narrative reviews

PICOS domain	Inclusion Criteria	Exclusion Criteria
	and retrospective cohort studies); SLR/(N)MAs of these study designs **A)** Comparative studies in screen-detected vs unscreened populations **B)** Non-comparative studies **Tier 2:** Case-control studies; cross-sectional studies; case series; SLR/(N)MAs of these study designs **A)** Comparative studies in screen-detected vs unscreened populations **B)** Non-comparative studies	• Editorials • Commentaries • Conference abstracts Other publication types that have not been peer-reviewed
Setting	**Tier 1:** • Studies conducted in the UK **Tier 2:** • Studies conducted in high-income countries where the population, screening methods and technology are expected to be similar to that of the UK (OECD and EEA countries excluding South Korea and Mexico)	• Studies in ineligible countries, or international studies where outcomes for eligible countries are not presented separately to outcomes from ineligible countries
Other considerations	• Articles published in the English language • Articles published since 2010	• Studies with abstract not in the English language • Articles published pre-2010

Abbreviations: EEA, European Economic Area; N/A, not applicable; (N)MA, (network) meta-analysis; OECD, Organisation for Economic Co-ordination and Development; PICOS, population-intervention-comparator-outcome-study design; POCUS, point-of-care ultrasound; RCT, randomised controlled trial; SLR, systematic literature review

Appendix 2 – Abstract reporting tables

What is the effectiveness of ultrasound screening in preventing emergency caesarean section and adverse maternal and neonatal outcomes?

TITLE	
Citation	*Bricker, L. (2015) Routine ultrasound in late pregnancy (after 24 weeks' gestation). Cochrane Database of Systematic Reviews, Issue 6. Art. No.: CD001451.*[19]
BACKGROUND	
Study type	*SLR*
Objectives	*To assess the effects on obstetric practice and pregnancy outcome of routine late pregnancy ultrasound, defined as greater than 24 weeks' gestation, in women with either unselected or low-risk pregnancies.*
Components of the study	***Population:*** *women with either unselected or low-risk pregnancies* ***Intervention:*** *routine late pregnancy ultrasound, defined as greater than 24 weeks' gestation* ***Comparator:*** *unscreened pregnant women* ***Outcomes:*** *perinatal mortality, preterm birth less than 37 weeks, induction of labour, caesarean section, preterm birth less than 34 weeks, maternal psychological effects and neurodevelopment at age 2.*
OUTCOMES	
Outcomes reported	*There was no association between ultrasound in late pregnancy and perinatal mortality RR 1.01, 95% CI 0.67 to 1.54; participants = 30,675; studies = 8 I^2= 29%), preterm birth less than 37 weeks (RR 0.96, 95% CI 0.85 to 1.08; participants = 17,151; studies = 2; I^2 = 0%), induction of labour (RR 0.93, 95% CI 0.81 to 1.07; participants = 22,663; studies = 6; I^2= 78%), or caesarean section (RR 1.03, 95% CI 0.92 to 1.15; participants = 27,461; studies = 6; I^2 = 54%).*
Conclusions	*Based on existing evidence, routine late pregnancy ultrasound in low-risk or unselected populations does not confer benefit on mother or baby.*

Abbreviations: CI, confidence interval; I^2, I-square [statistical heterogeneity]; RR, risk ratio; SLR, systematic literature review

TITLE	
Citation	*De Castro et al. (2020), Value of routine ultrasound examination at 35-37 weeks' gestation in diagnosis of non-cephalic presentation, Ultrasound in Obstetrics & Gynecology 55 (2), 248-256.*[20]
BACKGROUND	
Study type	*Retrospective study on routinely collected data*
Objectives	*To report the incidence of non-cephalic presentation at a routine scan at 35+0 to 36+6 weeks' gestation and the subsequent management of such pregnancies.*
Components of the study	***Population:*** *pregnant women with breech or transverse/oblique presentation* ***Intervention:*** *elective CS for fetal or maternal indications other than abnormal presentation, or ECV* ***Comparator:*** *none* ***Outcomes:*** *incidence of non-cephalic presentation at 35+0 to 36+6-week scan, presentation at birth* *The study also reports:* • *risk of non-cephalic presentation based on maternal and pregnancy factors* • *percentage of non-cephalic pregnancies not eligible for ECV due to planned CS for indications other than malpresentation* • *pregnant women eligible for ECV who agreed to the procedure, and its success rate* • *chance of successful ECV based on maternal and pregnancy factors* • *spontaneous rotation to cephalic presentation in pregnancies with non-cephalic presentation in which successful ECV was not carried out* • *chance of spontaneous rotation to cephalic presentation based on maternal and pregnancy factors* • *subsequent rotation to non-cephalic presentation in pregnancies with cephalic presentation,* • *cephalic presentation at birth in the case of non-cephalic presentation at scan* • *prediction of non-cephalic presentation from 35+0 to 36+6-week scan* • *prediction of successful ECV from maternal and pregnancy factors* • *prediction of spontaneous rotation from non-cephalic to cephalic presentation that persisted until birth*
OUTCOMES	
Outcomes reported	*Outcomes as specified in the commissioning document are not reported.*

	At 35+0 to 36+6 weeks, fetal presentation was cephalic in 43 416 (94.7%) pregnancies, breech in 1,987 (4.3%) and transverse or oblique in 444 (1.0%). *Of the 1,987 pregnancies with breech presentation at the 35+0 to 36+6-week scan, ultrasound examination 1 to 2 weeks later demonstrated spontaneous rotation to cephalic presentation in 327 (16.5%). In 620 (31.2%) cases, ECV was attempted, which was successful in 239 (38.5%). In 50 (2.5%) cases, there was spontaneous onset of labour before planned ECV.* *Of the total 2,431 cases of non-cephalic presentation at the time of the scan, presentation at birth was cephalic in 985 (40.5%); in 738 (74.9%) this was due to spontaneous rotation and in 247 (25.1%) this was due to successful ECV.* *The chance of spontaneous rotation from non-cephalic to cephalic presentation increased with increasing interval between the scan and birth.* *[Full text consulted]*
Conclusions	*The problem of unexpected non-cephalic presentation in labour can, to a great extent, be overcome by a routine ultrasound examination at 35+0 to 36+6 weeks' gestation.* *The incidence of non-cephalic presentation at the 35+0 to 36+6-week scan was about 5%, but, in about 40% of these cases, the presentation at birth was cephalic, mainly due to subsequent spontaneous rotation and, to a lesser extent, as a consequence of successful ECV.* *Such a diagnosis could potentially improve pregnancy outcome by preventing unexpected abnormal presentation in labour and, through ECV, reducing the incidence of non-cephalic presentation.*

Abbreviations: CS, caesarean section; ECV, external cephalic version.

TITLE	
Citation	*Wastlund D et al. (2019), Screening for breech presentation using universal late-pregnancy ultrasonography: A prospective cohort study and cost effectiveness analysis. PLoS Medicine. 2019,16 (4), e1002778.*[3]
BACKGROUND	
Study type	*Prospective cohort study and cost-effectiveness analysis*
Objectives	*To assess the cost-effectiveness of universal ultrasound scanning for breech presentation near 36 wkGA in nulliparous women.*
Components of the study	***Population:*** *nulliparous women* ***Intervention:*** *research screening ultrasound examination at 36 wkGA* ***Comparator:*** *group without clinically indicated ultrasound* ***Outcomes:*** *fetal presentation was assessed and compared for the groups with and without a clinically indicated ultrasound, likelihood of different mode of birth and associated long-term health outcomes for universal ultrasound to current practice.*
OUTCOMES	
Outcomes reported	*One-hundred-and-seventy-nine out of 3,879 women (4.6%) were diagnosed with breech presentation at 36 weeks. ECV was attempted for 84 (46.9%) women and was successful in 12 (success rate: 14.3%). Overall, 19 of the 179 women gave birth vaginally (10.6%), 110 gave birth by ELCS (61.5%) and 50 gave birth by EMCS (27.9%). There were no women with undiagnosed breech presentation in labour in the entire cohort. On average, 40 scans were needed per detection of a previously undiagnosed breech presentation.* *The economic analysis indicated that, compared to current practice, universal late-pregnancy ultrasound would identify around 14,826 otherwise undiagnosed breech presentations across England annually. It would also reduce EMCS and vaginal breech births by 0.7 and 1.0 percentage points, respectively: around 4,196 and 6,061 births across England annually. Universal ultrasound would also prevent 7.89 neonatal mortalities annually. The strategy would be cost effective if fetal presentation could be assessed for £19.80 or less per woman.*
Conclusions	*Universal late pregnancy ultrasound in nulliparous women (1) would virtually eliminate undiagnosed breech*

	presentation, (2) would be expected to reduce fetal mortality in breech presentation, and (3) would be cost effective if fetal presentation could be assessed for less than £19.80 per woman.

Abbreviations: ELCS, elective caesarean section; EMCS; emergency caesarean section, wkGA, 36 weeks of gestational age

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