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Assisted Vaginal Birth

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This is the fourth edition of this guideline, first published in October 2000 under the title *Instrumental vaginal delivery*, and revised in January 2011 and October 2005 under the title *Operative Vaginal Delivery*.

Executive summary

Preparation for assisted vaginal birth

Can assisted vaginal birth be avoided?

Encourage women to have continuous support during labour as this can reduce the need for assisted vaginal birth. A

Inform women that epidural analgesia may increase the need for assisted vaginal birth although this is less likely with newer analgesic techniques. *[New 2020]* A

Inform women that administering epidural analgesia in the latent phase of labour compared to the active phase of labour does not increase the risk of assisted vaginal birth. *[New 2020]* A

Encourage women not using epidural analgesia to adopt upright or lateral positions in the second stage of labour as this reduces the need for assisted vaginal birth. A

Encourage women using epidural analgesia to adopt lying down lateral positions rather than upright positions in the second stage of labour as this increases the rate of spontaneous vaginal birth. *[New 2020]* A

Recommend delayed pushing for 1–2 hours in nulliparous women with epidural analgesia as this may reduce the need for rotational and midpelvic assisted vaginal birth. B

Do not routinely discontinue epidural analgesia during pushing as this increases the woman's pain with no evidence of a reduction in the incidence of assisted vaginal birth. *[New 2020]* A

There is insufficient evidence to recommend any particular regional analgesia technique in terms of reducing the incidence of assisted vaginal birth. *[New 2020]* A

There is insufficient evidence to recommend routine oxytocin augmentation for women with epidural analgesia as a strategy to reduce the incidence of assisted vaginal birth. *[New 2020]* A

There is insufficient evidence to recommend routine prophylactic manual rotation of fetal malposition in the second stage of labour to reduce the risk of assisted vaginal birth. *[New 2020]* B

How should assisted vaginal birth be defined?

Use a standard classification system for assisted vaginal birth to promote safe clinical practice, effective communication between health professionals and audit of outcomes. D

When should assisted vaginal birth be recommended/contraindicated?

Operators should be aware that no indication is absolute and that clinical judgment is required in all situations. D

Suspected fetal bleeding disorders or a predisposition to fracture are relative contraindications to assisted vaginal birth. *[New 2020]* ✓

Blood borne viral infections in the woman are not an absolute contraindication to assisted vaginal birth. *[New 2020]* D

The use of a vacuum is not contraindicated following a fetal blood sampling procedure or application of a fetal scalp electrode. *[New 2020]* B

Operators should be aware that there is a higher risk of subgaleal haemorrhage and scalp trauma with vacuum extraction compared with forceps at preterm gestational ages. Vacuum birth should be avoided below 32 weeks of gestation and should be used with caution between 32^{+0} and 36^{+0} weeks of gestation. *[New 2020]* C

What are the essential conditions for safe assisted vaginal birth?

Safe assisted vaginal birth requires a careful assessment of the clinical situation, clear communication with the woman and healthcare personnel, and expertise in the chosen procedure (Table 3). D

Does ultrasound have a role in assessment prior to assisted vaginal birth?

Ultrasound assessment of the fetal head position prior to assisted vaginal birth is recommended where uncertainty exists following clinical examination. *[New 2020]* A

There is insufficient evidence to recommend the routine use of abdominal or perineal ultrasound for assessment of the station, flexion and descent of the fetal head in the second stage of labour. *[New 2020]* C

What type of consent is required prior to attempting assisted vaginal birth?

Women should be informed about assisted vaginal birth in the antenatal period, especially during their first pregnancy. If they indicate specific restrictions or preferences then this should be explored with an experienced obstetrician, ideally in advance of labour. ✓

For birth room procedures verbal consent should be obtained prior to assisted vaginal birth and the discussion should be documented in the notes. ✓

When midpelvic or rotational birth is indicated, the risks and benefits of assisted vaginal birth should be compared with the risks and benefits of second stage caesarean birth for the given circumstances and skills of the operator. Written consent should be obtained for a trial of assisted vaginal birth in an operating theatre. *[New 2020]* ✓

Performing assisted vaginal birth

Who should perform assisted vaginal birth?

Assisted vaginal birth should be performed by, or in the presence of, an operator who has the knowledge, skills and experience necessary to assess the woman, complete the procedure and manage any complications that arise. D

Advise obstetric trainees to achieve expertise in spontaneous vaginal birth prior to commencing training in assisted vaginal birth. ✓

Ensure obstetric trainees receive appropriate training in vacuum and forceps birth, including theoretical knowledge, simulation training and clinical training under direct supervision. *[New 2020]* ✓

Competency should be demonstrated before conducting unsupervised births. *[New 2020]* ✓

Complex assisted vaginal births should only be performed by experienced operators or under the direct supervision of an experienced operator. D

Who should supervise assisted vaginal birth?

An experienced operator, competent at midpelvic births, should be present from the outset to supervise all attempts at rotational or midpelvic assisted vaginal birth. D

Where should assisted vaginal birth take place?

Non-rotational low-pelvic and lift out assisted vaginal births have a low probability of failure and most procedures can be conducted safely in a birth room. ***[New 2020]*** C

Assisted vaginal births that have a higher risk of failure should be considered a trial and be attempted in a place where immediate recourse to caesarean birth can be undertaken. C

What instruments should be used for assisted vaginal birth?

The operator should choose the instrument most appropriate to the clinical circumstances and their level of skill. ✓

Operators should be aware that forceps and vacuum extraction are associated with different benefits and risks; failure to complete the birth with a single instrument is more likely with vacuum extraction, but maternal perineal trauma is more likely with forceps. ***[New 2020]*** A

Operators should be aware that soft cup vacuum extractors have a higher rate of failure but a lower incidence of neonatal scalp trauma. ***[New 2020]*** A

Rotational births should be performed by experienced operators; the choice of instrument depending on the clinical circumstances and expertise of the individual. The options include Kielland's rotational forceps, manual rotation followed by direct traction forceps or vacuum, and rotational vacuum extraction. C

When should vacuum-assisted birth be discontinued and how should a discontinued vacuum procedure be managed?

Discontinue vacuum-assisted birth where there is no evidence of progressive descent with moderate traction during each pull of a correctly applied instrument by an experienced operator. ***[New 2020]*** ✓

Complete vacuum-assisted birth in the majority of cases with a maximum of three pulls to bring the fetal head on to the perineum. Three additional gentle pulls can be used to ease the head out of the perineum. ***[New 2020]*** ✓

If there is minimal descent with the first two pulls of a vacuum, the operator should consider whether the application is suboptimal, the fetal position has been incorrectly diagnosed or there is cephalopelvic disproportion. Less experienced operators should stop and seek a second opinion. Experienced operators should re-evaluate the clinical findings and either change approach or discontinue the procedure. ***[New 2020]*** ✓

Discontinue vacuum-assisted birth if there have been two 'pop-offs' of the instrument. Less experienced operators should seek senior support after one 'pop-off' to ensure the woman has the best chance of a successful assisted vaginal birth. ***[New 2020]*** ✓

The rapid negative pressure application for vacuum-assisted birth is recommended as it reduces the duration of the procedure with no difference in maternal and neonatal outcomes. ***[New 2020]*** ✓

The use of sequential instruments is associated with an increased risk of trauma to the infant. However, the operator needs to balance the risks of a caesarean birth following failed vacuum extraction with the risks of forceps birth following failed vacuum extraction. B

Obstetricians should be aware of the increased neonatal morbidity following failed vacuum-assisted birth and/or sequential use of instruments, and should inform the neonatologist when this occurs to ensure appropriate care of the baby. ✓

Obstetricians should be aware of the increased risk of obstetric anal sphincter injury (OASI) following sequential use of instruments. ***[New 2020]*** C

When should attempted forceps birth be discontinued and how should a discontinued forceps procedure be managed?

Discontinue attempted forceps birth where the forceps cannot be applied easily, the handles do not approximate easily or if there is a lack of progressive descent with moderate traction. ***[New 2020]*** B

Discontinue rotational forceps birth if rotation is not easily achieved with gentle pressure. ***[New 2020]*** B

Discontinue attempted forceps birth if birth is not imminent following three pulls of a correctly applied instrument by an experienced operator. ***[New 2020]*** B

If there is minimal descent with the first one or two pulls of the forceps, the operator should consider whether the application is suboptimal, the position has been incorrectly diagnosed or there is cephalopelvic disproportion. Less experienced operators should stop and seek a second opinion. Experienced operators should re-evaluate the clinical findings and either change approach or discontinue the procedure. ***[New 2020]*** ✓

Obstetricians should be aware of the potential neonatal morbidity following a failed attempt at forceps birth and should inform the neonatologist when this occurs to ensure appropriate management of the baby. ***[New 2020]*** ✓

Obstetricians should be aware of the increased risk of fetal head impaction at caesarean birth following a failed attempt at birth via forceps and should be prepared to disimpact the fetal head using recognised manoeuvres. ***[New 2020]*** ✓

What is the role of episiotomy in preventing maternal pelvic floor morbidity at assisted vaginal birth?

Mediolateral episiotomy should be discussed with the woman as part of the preparation for assisted vaginal birth. *[New 2020]* ✓

In the absence of robust evidence to support either routine or restrictive use of episiotomy at assisted vaginal birth, the decision should be tailored to the circumstances at the time and the preferences of the woman. The evidence to support use of mediolateral episiotomy at assisted vaginal birth in terms of preventing OASI is stronger for nulliparous women and for birth via forceps. *[New 2020]* B

When performing a mediolateral episiotomy the cut should be at a 60 degree angle initiated when the head is distending the perineum. *[New 2020]* B

Aftercare following assisted vaginal birth

Should prophylactic antibiotics be given?

A single prophylactic dose of intravenous amoxicillin and clavulanic acid should be recommended following assisted vaginal birth as it significantly reduces confirmed or suspected maternal infection compared to placebo. *[New 2020]* A

Good standards of hygiene and aseptic techniques are recommended. ✓

Should thromboprophylaxis be given?

Reassess women after assisted vaginal birth for venous thromboembolism risk and the need for thromboprophylaxis. D

What analgesia should be given after birth?

In the absence of contraindications, women should be offered regular nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol routinely. A

What precautions should be taken for care of the bladder after birth?

Women should be educated about the risk of urinary retention so that they are aware of the importance of bladder emptying in the postpartum period. *[New 2020]* ✓

The timing and volume of the first void urine should be monitored and documented. *[New 2020]* C

A post void residual should be measured if urinary retention is suspected. ✓

Recommend that women who have received regional analgesia for a trial of assisted vaginal birth in theatre have an indwelling catheter in situ after the birth to prevent covert urinary retention. This should be removed according to the local protocol. *[New 2020]* ✓

Offer women physiotherapy-directed strategies to reduce the risk of urinary incontinence at 3 months. B

How can psychological morbidity be reduced for the woman?

Shared decision making, good communication, and positive continuous support during labour and birth have the potential to reduce psychological morbidity following birth. *[New 2020]* ✓

Review women before hospital discharge to discuss the indication for assisted vaginal birth, management of any complications and advice for future births. Best practice is where the woman is reviewed by the obstetrician who performed the procedure. ✓

Offer advice and support to women who have had a traumatic birth and wish to talk about their experience. The effect on the birth partner should also be considered. *[New 2020]* ✓

Do not offer single session, high-intensity psychological interventions with an explicit focus on 'reliving' the trauma. *[New 2020]* ✓

Offer women with persistent post-traumatic stress disorder (PTSD) symptoms at 1 month referral to skilled professionals as per the NICE guidance on PTSD. *[New 2020]* D

What information should women be given for future births?

Inform women that there is a high probability of a spontaneous vaginal birth in subsequent labours following assisted vaginal birth. *[New 2020]* B

Individualise care for women who have sustained a third- or fourth-degree perineal tear, or who have ongoing pelvic floor morbidity. ✓

Governance issues

What type of documentation should be completed for assisted vaginal birth?

Documentation for assisted vaginal birth should include detailed information on the assessment, decision making and conduct of the procedure, a plan for postnatal care and sufficient information for counselling in relation to subsequent pregnancies. Use of a standardised proforma is recommended. *[New 2020]* ✓

Paired cord blood samples should be processed and recorded following all attempts at assisted vaginal birth. *[New 2020]* ✓

Adverse outcomes, including unsuccessful assisted vaginal birth, major obstetric haemorrhage, OASI, shoulder dystocia and significant neonatal complications should trigger an incident report as part of effective risk management processes. *[New 2020]* ✓

How should serious adverse events be dealt with?

Obstetricians should ensure that the ongoing care of the woman, baby and family is paramount. *[New 2020]* ✓

Obstetricians have a duty of candour; a professional responsibility to be honest with patients when things go wrong. *[New 2020]* ✓

Obstetricians should contribute to adverse event reporting, confidential enquiries, and take part in regular reviews and audits. They should respond constructively to outcomes of reviews, taking necessary steps to address any problems and carry out further retraining where needed. *[New 2020]* ✓

Maternity units should provide a safe and supportive framework to support women, their families and staff when serious adverse events occur. *[New 2020]* ✓

1. Purpose and scope

The aim of this guideline is to provide evidence-based recommendations on the use of forceps and vacuum extraction for both rotational and non-rotational assisted vaginal births. In order to provide safe care for the full range of clinical scenarios, obstetricians should develop competency in the use of both vacuum and forceps for non-rotational birth and at least one specialist technique for rotational birth. The scope of this guideline includes indications, procedures and governance issues relating to assisted vaginal birth.

2. Introduction and background

Assisted vaginal birth by vacuum or forceps is used to assist birth for maternal and fetal indications. In the UK, between 10% and 15% of all women give birth by assisted vaginal birth.[1] Almost one in every three nulliparous women gives birth by vacuum or forceps, with lower rates in midwifery-led care settings.[2,3] There has been a rise in the rate of caesarean births in the second stage of labour; this may reflect concerns about assisted vaginal birth morbidity or a loss of clinical skills.[4]

The majority of births by vacuum and forceps, when performed correctly by appropriately trained personnel, result in a safe outcome for the woman and baby.[5] Women who achieve an assisted vaginal birth rather than have a caesarean birth with their first child are far more likely to have an uncomplicated vaginal birth in subsequent pregnancies.[6–8] However, obstetricians, midwives and neonatologists should be aware that serious rare complications, such as subgaleal haemorrhage, intracranial haemorrhage, skull fracture and spinal cord

injury, can result in perinatal death and that these complications are more likely to occur with midpelvic, rotational and failed attempts at assisted vaginal birth.[5,9] The alternative choice of a caesarean birth late in the second stage of labour can be very challenging and result in significant maternal and perinatal morbidity. As a result, complex decision making is required when choosing between assisted vaginal birth and second-stage caesarean birth.

Two new developments have occurred since the publication of the 2011 guideline: i) the Montgomery ruling has emphasised the importance of informed consent; and ii) a number of high profile manslaughter convictions on the grounds of gross negligence have highlighted the risk of a criminal conviction, where serious shortcomings are identified in medical care provided to a patient who dies. The Royal College of Obstetricians and Gynaecologists (RCOG) has also received reports of a number of neonatal fatalities associated with traumatic birth-related injuries. It is in this context that the safety aspects of this guideline have been reviewed and updated.

3. Identification and assessment of evidence

This guideline was developed using standard methodology for developing RCOG Green-top Guidelines (GTGs). The Cochrane Library (including the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects [DARE] and the Cochrane Central Register of Controlled Trials [CENTRAL]), EMBASE, MEDLINE and Trip were searched for relevant papers. The search was inclusive of all relevant articles published until May 2019. The databases were searched using the relevant Medical Subject Headings (MeSH) terms, including all subheadings and synonyms, and this was combined with a keyword search. Search terms included 'obstetrical forceps', 'manual rotation', 'assisted deliver*', 'assisted vaginal deliver*', 'instrumental deliver*' and 'operative birth'. The search was limited to studies on humans and papers in the English language. Relevant guidelines were also searched for using the same criteria in the National Guideline Clearinghouse and the National Institute for Health and Care Excellence (NICE) Evidence Search. The full search strategy is available to view online as supporting information (Appendix S1 and S2).

Where possible, recommendations are based on available evidence. Areas lacking evidence are highlighted and annotated as 'good practice points'. Further information about the assessment of evidence and the grading of recommendations may be found in Appendix 1.

4. Preparation for assisted vaginal birth

4.1. Can assisted vaginal birth be avoided?

Encourage women to have continuous support during labour as this can reduce the need for assisted vaginal birth. A

Inform women that epidural analgesia may increase the need for assisted vaginal birth although this is less likely with newer anaesthetic techniques. A

Inform women that administering epidural analgesia in the latent phase of labour compared to the active phase of labour does not increase the risk of assisted vaginal birth. A

Encourage women not using epidural analgesia to adopt upright or lateral positions in the second stage of labour as this reduces the need for assisted vaginal birth. A

Encourage women using epidural analgesia to adopt lying down lateral positions rather than upright positions in the second stage of labour as this increases the rate of spontaneous vaginal birth. A

Recommend delayed pushing for 1–2 hours in nulliparous women with epidural analgesia as this may reduce the need for rotational and midpelvic assisted vaginal birth. B

Do not routinely discontinue epidural analgesia during pushing as this increases the woman's pain with no evidence of a reduction in the incidence of assisted vaginal birth. A

There is insufficient evidence to recommend any particular regional analgesia technique in terms of reducing the incidence of assisted vaginal birth. A

There is insufficient evidence to recommend routine oxytocin augmentation for women with epidural analgesia as a strategy to reduce the incidence of assisted vaginal birth. A

There is insufficient evidence to recommend routine prophylactic manual rotation of fetal malposition in the second stage of labour to reduce the risk of assisted vaginal birth. B

As assisted vaginal birth can be associated with maternal and neonatal morbidity, strategies that reduce the need for intervention should be used. Continuous support for women during childbirth has been shown to increase the likelihood of spontaneous vaginal birth (26 trials; *n* = 15 858; risk ratio [RR] 1.08, 95% CI 1.04–1.12) and reduce the likelihood of assisted vaginal birth (RR 0.90, 95% CI 0.85–0.96), particularly when the carer is not a member of staff.[10] Evidence level 1++

Epidural analgesia compared with non-epidural methods is associated with an increased incidence of assisted vaginal birth (23 trials; *n* = 7935; OR 1.42, 95% CI 1.28–1.57), but provides better pain relief than non-epidural analgesia (3 trials; *n* = 1166; mean difference in maternal perception of pain –3.36; 95% CI –5.41 to –1.31).[2] A post hoc subgroup analysis did not replicate this increase in assisted vaginal births suggesting that approaches to epidural analgesia in labour (use of lower concentrations of local analgesic or patient-controlled epidural analgesia (PCEA)) do not have this outcome." Evidence level 1++

Administering epidural analgesic in the latent phase of labour compared to the active phase does not increase the risk of assisted vaginal birth in nulliparous women (6 trials; *n* = 15 399; RR 0.96, 95% CI 0.89–1.05).[11] Evidence level 1+

The use of any upright or lateral position in the second stage of labour, compared with supine or lithotomy positions, is associated with a reduction in assisted births in women not using epidural analgesia (21 trials; n = 6481; RR 0.75, 95% CI 0.66 to –0.86).[12]

Evidence level 1+

A randomised trial included 3236 nulliparous women with a low-dose epidural to determine whether being upright in the second stage of labour increases the chance of spontaneous vaginal birth compared with lying down. Significantly fewer spontaneous vaginal births occurred in women in the upright group at 35.2% (548/1556) compared with 41.1% (632/1537) in the lying down group (adjusted RR 0.86, 95% CI 0.78–0.94). This represents a 5.9% absolute increase in the chance of spontaneous vaginal birth in the lying down group (number needed to treat 17; 95% CI 11–40).[13,14]

Evidence level 1+

A meta-analysis demonstrated that nulliparous women with epidurals are likely to have fewer rotational or midpelvic operative interventions when pushing is delayed for 1 to 2 hours or until they have a strong urge to push (RR 0.59, 95% CI 0.36–0.98),[15] although a more recent meta-analysis concluded that, when the analysis is restricted to high-quality studies, the effect was smaller and did not reach statistical significance.[16]

Evidence level 1++

There is insufficient evidence to support the hypothesis that discontinuing epidural analgesia reduces the incidence of assisted vaginal birth (23% versus 28%; RR 0.84, 95% CI 0.61–1.15), but there is evidence that it increases the woman's pain (22% versus 6%; RR 3.68, 95% CI 1.99–6.80).[17]

Evidence level 1++

There is no difference between the rates of assisted vaginal birth for combined spinal–epidural and standard epidural techniques (19 trials; n = 2658; OR 0.82, 95% CI 0.67–1.00),[18] or patient-controlled epidural analgesia (PCEA) and standard epidural technique. A meta-analysis of nine studies, including 641 women, comparing PCEA to continuous infusion showed that obstetric outcomes were comparable in all included studies.[19] A randomised controlled trial (RCT) of 126 women comparing PCEA with continuous epidural infusion reported similar rates of normal birth.[20]

Evidence level 1+

A systematic review evaluating the use of oxytocin at 6 cm dilatation onwards did not report a significant reduction in assisted vaginal birth (two studies; n = 319; RR 0.88, 95% CI 0.72–1.08). The review reported a higher rate of uterine rupture in multiparous women where oxytocin had been commenced.[21] The NICE intrapartum care guideline[22] has concluded that oxytocin should not be routinely started in the second stage of labour and should be used with caution in multiparous women. An experienced obstetrician should make a thorough assessment before considering oxytocin in the second stage of labour for a multiparous woman.

Evidence level 1+

Manual rotation has been explored as a strategy to correct fetal malposition and is recommended in the guideline of the Society of Obstetricians and Gynaecologists of Canada.[23] A retrospective cohort study reported a reduction in caesarean birth associated with the use of manual rotation (9% versus 41%; $P < 0.001$).[24] Of the 731 women in this study who underwent manual rotation, no woman experienced an umbilical cord prolapse, and there was no difference in birth trauma or neonatal acidaemia between neonates who had experienced an attempt at manual rotation and those who had not. A prospective cohort study of 172 attempts at manual rotation reported a 90% success rate with a reduction in

Evidence level 1–

operative birth (23% versus 39%; OR 0.52, 95% CI 0.28–0.95).[25] Given these data, manual rotation of the fetal occiput for malposition in the second stage of labour warrants further evaluation as a potential strategy to consider before moving to assisted vaginal birth or caesarean birth. A pilot RCT of 30 women where fetal malposition was corrected by manual rotation early in the second stage of labour reported a similar rate of assisted vaginal birth.[26] A second RCT including 65 women showed a reduction in the duration of the second stage of labour (65 minutes versus 82 minutes; $P = 0.04$).[27] Neither study reported any adverse effects related to manual rotation. Larger RCTs are needed to establish if prophylactic manual rotation early in the second stage of labour can lead to a reduction in operative births.[26]

Evidence level 1–

4.2. *How should assisted vaginal birth be defined?*

Use a standard classification system for assisted vaginal birth to promote safe clinical practice, effective communication between health professionals and audit of outcomes.

D

Systematic abdominal and vaginal examinations are required to confirm the classification for assisted vaginal birth. Marked caput may give the impression that the vertex is lower than it is. In the majority of cases the fetal head will not be palpable abdominally, the exception being a deflexed occipito posterior position where up to one-fifth of the fetal head may be palpable abdominally when the fetal skull is at station 0 cm or below. A classification system was developed for the previous version of this guideline and was included in the ACOG guidelines (see Table 1).[28]

Table 1. Classification for assisted vaginal birth[28]

Outlet	Fetal scalp visible without separating the labia Fetal skull has reached the perineum Rotation does not exceed 45°
Low	Fetal skull is at station + 2 cm, but not on the perineum Two subdivisions: 1. Non-rotational ≤ 45° 2. Rotational > 45°
Mid	Fetal head is no more than one-fifth palpable per abdomen Leading point of the skull is at station 0 or + 1 cm Two subdivisions: 1. Non-rotational ≤ 45° 2. Rotational > 45°

4.3. *When should assisted vaginal birth be recommended/contraindicated?*

Operators should be aware that no indication is absolute and that clinical judgment is required in all situations.

D

Suspected fetal bleeding disorders or a predisposition to fracture are relative contraindications to assisted vaginal birth.

✓

Blood borne viral infections in the mother are not an absolute contraindication to assisted vaginal birth. D

Vacuum extraction is not contraindicated following a fetal blood sampling procedure or application of a fetal scalp electrode. B

Operators should be aware that there is a higher risk of subgaleal haemorrhage and scalp trauma with vacuum extraction compared with forceps at preterm gestational ages. Vacuum birth should be avoided below 32 weeks of gestation and should be used with caution between 32^{+0} and 36^{+0} weeks of gestation. C

Operative intervention may be indicated for conditions of the fetus, the mother or both (see Table 2). The decision requires clinical judgment based on the maternal and fetal findings, preferences of the woman and experience of the obstetrician.[29] A retrospective cohort study of 15 759 nulliparous women demonstrated that maternal morbidity increased significantly after 3 hours of the second stage and increased further after 4 hours. There was no evidence of neonatal morbidity increasing in this retrospective study, where fetal surveillance and timely obstetric intervention were used.[30] The time constraints listed in Table 2 are therefore provided for guidance. The question of when to intervene should involve consideration of the risks and benefits of continued pushing versus those of an assisted vaginal birth versus those of a second stage caesarean birth.

No indication is absolute and each case should be considered individually. The threshold to intervene may be lower where several factors coexist. Medical indications include cardiac disease, hypertensive crisis, cerebral vascular disease or malformations, myasthenia gravis and spinal cord injury. Forceps and vacuum extraction are contraindicated before full dilatation of the cervix. Forceps can be used for the after-coming head of the breech. The vacuum extractor is contraindicated with a face presentation.

Fetal bleeding disorders (for example, alloimmune thrombocytopenia)[31] or a predisposition to fracture (for example, osteogenesis imperfecta) are relative contraindications to assisted vaginal birth. However, there may be considerable risks if the fetal head has to be delivered abdominally from deep in the pelvis. Experienced obstetricians should be involved in the decision-making for exceptional indication and, ideally, Evidence level 4

Table 2. Indications for assisted vaginal birth[22],[28]

Fetal	Suspected fetal compromise (cardiotocography pathological, abnormal fetal blood sampling result, thick meconium)
Maternal	Nulliparous women – lack of continuing progress for 3 hours (total of active and passive second-stage labour) with regional analgesia or 2 hours without regional analgesia
	Parous women – lack of continuing progress for 2 hours (total of active and passive second-stage labour) with regional analgesia or 1 hour without regional analgesia
	Maternal exhaustion or distress
	Medical indications to avoid Valsalva manoeuvre
Combined	Fetal and maternal indications for assisted vaginal birth often coexist

a discussion will have taken place and be documented in advance of labour. A low forceps may be acceptable for assisted vaginal birth with suspected fetal bleeding disorders, but vacuum extraction should be avoided.

Evidence level 4

Blood borne viral infections of the mother are not a contraindication to assisted vaginal birth. A population-based surveillance study of 251 assisted vaginal births in HIV-positive women reported that one infant had confirmed infection at 18 months of age. The maternal characteristics suggested that transmission may not have been intrapartum.[32] However, it is sensible to avoid difficult assisted vaginal birth where there is an increased chance of fetal abrasion or scalp trauma, as it is to avoid fetal scalp electrodes or blood sampling during labour.[33]

Evidence level 3

Two case studies reported a risk of fetal haemorrhage when a vacuum extractor was applied following fetal blood sampling or application of a spiral scalp electrode.[34,35] However, no bleeding was reported in two randomised trials comparing forceps and vacuum extraction following fetal blood sampling.[36,37]

Evidence level 1+ and 3

A retrospective population-based study including 5064 vacuum and 432 forceps births between 32^{+0} and 36^{+6} weeks of gestation reported an increased risk of subgaleal hemorrhage (0.16% versus 0%), intracranial haemorrhage (0.12% versus 0%) and scalp trauma (9.8% versus 6.3%) associated with vacuum extraction when compared with forceps birth.[38] A Swedish register-based study reported vacuum birth in 5.7% of preterm births with increased incidence of intracranial haemorrhage (1.5%; adjusted OR [aOR] 1.84, 95% CI 1.09–1.32) and extracranial haemorrhage (0.64%; aOR 4.48, 95% CI 2.84–7.07) compared with spontaneous vaginal birth.[39] A separate follow-up study reported comparable long-term neurological outcomes for 266 babies born by vacuum extraction.[40] Below 32^{+0} weeks of gestation, the use of vacuum extraction is not recommended because of the susceptibility of the preterm infant to cephalohaematoma, intracranial haemorrhage, subgaleal haemorrhage and neonatal jaundice.

Evidence level 2+

4.4. *What are the essential conditions for safe assisted vaginal birth?*

Safe assisted vaginal birth requires a careful assessment of the clinical situation, clear communication with the woman and healthcare personnel, and expertise in the chosen procedure (Table 3).

D

Like any operative intervention, adequate preparation and planning is important.[29]

Evidence level 4

4.5. *Does ultrasound have a role in assessment prior to assisted vaginal birth?*

Clinicians should be aware that ultrasound assessment of the fetal head position prior to assisted vaginal birth is more reliable than clinical examination.

A

There is insufficient evidence to recommend the routine use of abdominal or perineal ultrasound for assessment of the station, flexion and descent of the fetal head in the second stage of labour.

C

Table 3. Safety criteria for assisted vaginal birth

Full abdominal and vaginal examination	• Head is ≤ 1/5 palpable per abdomen (in most cases not palpable) • Cervix is fully dilated and the membranes ruptured • Station at level of ischial spines or below • Position of the fetal head has been determined • Caput and moulding is no more than moderate (or +2)[a] • Pelvis is deemed adequate
Preparation of mother	• Clear explanation given and informed consent taken and documented in women's case notes • Trust established and full cooperation sought and agreed with woman • Appropriate analgesia is in place: for midpelvic or rotational birth, this will usually be a regional block; a pudendal block may be acceptable depending on urgency; and a perineal block may be sufficient for low or outlet birth • Maternal bladder has been emptied • Indwelling catheter has been removed or balloon deflated • Aseptic technique
Preparation of staff	• Operator has the knowledge, experience and skill necessary • Adequate facilities are available (equipment, bed, lighting) and access to an operating theatre • Backup plan: for midpelvic births, theatre facilities should be available to allow a caesarean birth to be performed without delay; a senior obstetrician should be present if an inexperienced obstetrician is conducting the birth • Anticipation of complications that may arise (e.g. shoulder dystocia, perineal trauma, postpartum haemorrhage) • Personnel present who are trained in neonatal resuscitation

[a]Moderate moulding or +2 moulding is where the parietal bones are overlapped but easily reduced; severe moulding or +3 is where the parietal bones have overlapped and are irreducible indicating cephalopelvic disproportion.

A multicentre RCT compared ultrasound assessment of the fetal head position prior to assisted vaginal birth with standard care to determine whether the use of ultrasound can reduce the incidence of incorrect diagnosis of the fetal head position. The incidence of incorrect diagnosis was significantly lower in the ultrasound group than the standard care group (4/257 [1.6%] versus 52/257 [20.2%]; OR 0.06, 95% CI 0.02–0.19; $P < 0.001$).[41] While correct diagnosis of the fetal head position is a prerequisite for safe assisted vaginal birth, the ultrasound assessment in itself does not lead to a reduction in morbidity. A further trial evaluated ultrasound assessment of the fetal head position from 8 cm cervical dilatation compared with standard vaginal examination and reported a higher incidence of caesarean birth in the ultrasound group (7.8% versus 4.9%; RR 1.60, 95% CI 1.12–2.28), but no significant difference in rates of assisted vaginal birth (25.8% versus 22.2%; RR 1.16, 95% CI 0.99–1.37).[42]

Evidence level 1+

>A survey of obstetricians in the UK and Ireland reported errors in diagnosing the fetal head position at all levels of experience.[43] Therefore, use of ultrasound to define the fetal head position prior to assisted vaginal birth may be a valuable assessment tool, particularly where there is uncertainty about the clinical findings. The operator should be trained in determining the fetal head position using abdominal ultrasound.[44]

Evidence level 1+

A number of observational studies have reported use of abdominal or perineal ultrasound to assess the fetal station, flexion of the head and direction of head descent in the second stage of labour.[45–47] Currently, there is insufficient standardisation of these techniques or evidence of benefit to recommend their routine use in clinical practice.

Evidence level 2+

4.6. *What type of consent is required prior to attempting assisted vaginal birth?*

Women should be informed about assisted vaginal birth in the antenatal period, especially during their first pregnancy. If they indicate specific restrictions or preferences then this should be explored with an experienced obstetrician, ideally in advance of labour. ✓

For birth room procedures verbal consent should be obtained prior to assisted vaginal birth and the discussion should be documented in the notes. ✓

When midpelvic or rotational birth is indicated, the risks and benefits of assisted vaginal birth should be compared with the risks and benefits of second stage caesarean birth for the given circumstances and skills of the operator. Written consent should be obtained for a trial of assisted vaginal birth in an operating theatre. ✓

The 2015 Montgomery determination clarified UK law and set new standards for consent, stating that doctors have a duty to ensure that patients understand the material risks of any medical intervention and the risks of any reasonable alternatives.[48,49] The role of the obstetrician is to have a dialogue to ensure that the patient understands the risks and benefits, and can make an informed choice. By the very nature of assisted vaginal birth, consent will need to be obtained at the end of labour in an emergency setting. The situation is not always conducive to assimilation of detailed information by the woman to make an informed choice.[50] Therefore, women should be informed about assisted vaginal birth as part of routine antenatal education, particularly when having their first baby where the chance of requiring a forceps or vacuum birth is highest. This information should include strategies known to be effective in reducing the need for assisted vaginal birth and an explanation of the comparative morbidities for assisted vaginal birth and second stage caesarean birth. Evidence level 4

The woman's birth plan, including any preferences or objections to a particular instrument, should be taken into account and discussed.[22] Care needs to be taken as women may be exhausted, in pain or affected by drugs. The principles of obtaining valid consent during labour should be followed.[51,52] Information provided to women in labour should be given between contractions. The ability to present risk-based information in a time-sensitive manner appropriate to the clinical circumstances is essential in order to achieve informed consent. Obstetricians must document their assessment findings, reasons for proceeding to an assisted vaginal birth and that consent has been given. Evidence level 4

Complex decision making is required when choosing between a trial of midpelvic rotational assisted vaginal birth in theatre and second stage caesarean birth with a deeply engaged fetal head. A multicentre prospective cohort study in the UK of 393 women transferred to theatre in the second stage of labour reported a higher incidence of maternal haemorrhage and neonatal unit admission following caesarean birth, but a higher incidence of pelvic floor morbidity and neonatal trauma with assisted vaginal birth. The incidence of pelvic floor morbidity was three-fold higher at 6 weeks, but this attenuated at 1 and 3 years. Women who gave birth by assisted vaginal birth were far more likely to have a vaginal birth in a subsequent pregnancy (80% versus 30%) and there were no differences in neurodevelopmental outcomes at 5 years.[8,53,54] Evidence level 2+

Two large retrospective cohort studies compared adverse neonatal outcomes for assisted vaginal birth and second stage caesarean birth; an Irish study reported similar rates of complications and an Israeli study[55] reported poorer neonatal outcomes for the caesarean group.[56,57] A secondary analysis of a randomised trial of 990 nulliparous women who gave birth by forceps, vacuum or caesarean birth in the US reported comparable rates of adverse neonatal outcomes for each mode of birth.[58] Two Canadian studies[59,60] reported conflicting results. A large retrospective study[59] reported higher rates of severe birth trauma with midpelvic assisted vaginal birth compared with caesarean birth, highest with sequential instrument use, whereas a prospective cohort study[60] reported no difference between midpelvic and low assisted vaginal birth for either severe maternal or neonatal morbidity.

Evidence level 2+

Obstetricians should refer to the RCOG Consent Advice No. 11 *Assisted Vaginal Birth*[61] and Clinical Governance Advice No. 6a *Obtaining Valid Consent to Participate in Perinatal Research Where Consent is Time Critical*.[52]

Evidence level 2+

5. Performing assisted vaginal birth

5.1. Who should perform assisted vaginal birth?

Assisted vaginal birth should be performed by, or in the presence of, an operator who has the knowledge, skills and experience necessary to assess the woman, complete the procedure and manage any complications that arise.

D

Advise obstetric trainees to achieve expertise in spontaneous vaginal birth prior to commencing training in assisted vaginal birth.

✓

Ensure obstetric trainees receive appropriate training in vacuum and forceps birth, including theoretical knowledge, simulation training and clinical training under direct supervision.

✓

Competency should be demonstrated before conducting unsupervised births.

✓

Complex assisted vaginal births should only be performed by experienced operators or under the direct supervision of an experienced operator.

D

Training is central to patient safety initiatives. Systems analysis reveals inadequate training as a key contributor to adverse outcomes.[62]

Evidence level 2+

The goal of assisted vaginal birth is to mimic spontaneous vaginal birth, thereby expediting birth with a minimum of maternal or neonatal morbidity. An understanding of the anatomy of the birth canal, the fetal head and the mechanism of normal labour is a prerequisite to becoming a skilled obstetrician. It is strongly recommended that obstetricians achieve experience in spontaneous vaginal birth before commencing training in vacuum or forceps birth.

Obstetric trainees should familiarise themselves with the theoretical knowledge required for the technical and non-technical skills of assisted vaginal birth. A wide range of resources are available, including guidelines, clinical skills taxonomy lists based on expert obstetric practice,[29,63–65] manuals[66] and online training resources (for example, StratOG). These should be supplemented with initial training in a simulation setting. As with any operative procedure, trainees will need to be taught and observed in the clinical setting and have their technique corrected and adjusted by a senior operator until they are deemed ready for independent practice. It should be made clear to the labouring woman that a trainee operator is working under direct supervision of an experienced operator.

Evidence level 4

Assessment of clinical competence is a key element of core training. Competence should be assessed ideally using the OSATS [objective structured assessment of technical skills] form designed for assisted vaginal birth by the RCOG.[67] No data exist on the minimum number of supervised procedures necessary before competence is achieved and this is likely to vary at the individual level. Each unit should ideally have specified trainers responsible for training and assessment.[68] Local and specialist courses in labour ward management can contribute to the development and maintenance of operative birth expertise.

Evidence level 4

Once trained, it may be useful for practitioners to audit their performance. One study has demonstrated the potential for the monitoring of obstetricians' performance on vacuum extraction by the use of statistical process control charts.[69] Another study has looked at the position of the chignon as a monitoring tool of cup application.[70] Further work needs to be done to develop data collection tools with consideration for case complexity and how the results can be fed back to individuals in a constructive manner.

Evidence level 3

The complexity of the birth is related to the type of assisted vaginal birth as classified in Table 1. Midpelvic and rotational births, independent of the instrument used, demand a high level of clinical and technical skill and are associated with higher rates of maternal and neonatal morbidity. The operator must receive adequate training and supervision prior to embarking on independent practice. Serious neonatal trauma has been associated with initial unsuccessful attempts at assisted vaginal birth by inexperienced operators.[71] [Appendix 3]

Evidence level 2+

5.2. *Who should supervise assisted vaginal birth?*

An experienced operator, competent at midpelvic births, should be present from the outset to supervise all attempts at rotational or midpelvic assisted vaginal birth.

D

Where there is any uncertainty about successful assisted vaginal birth, an experienced operator should assess the patient to ensure that the correct decision has been made to attempt assisted vaginal birth and that this is being conducted with the most appropriate instrument in the most appropriate setting.[29] For a trial of assisted vaginal birth in theatre, an experienced operator should attend in person or should be immediately available if the trainee on duty has not been assessed and signed-off as competent.[72]

Evidence level 4

A prospective cohort study of 597 consecutive assisted vaginal births in a large teaching hospital in Ireland demonstrated no evidence of an association between time of assisted vaginal birth (day versus night) and adverse perinatal outcomes despite off-site consultant obstetric support at night. There was a policy of senior obstetric attendance for all attempted assisted vaginal births in an operating theatre.[73] A retrospective study from Israel reported higher rates of neonatal morbidity in association with vacuum births at night, but no information was provided on staffing.[74]

Evidence level 2+

There is evidence from one study in the US of an association between increasing trainee forceps use and positive birth outcomes from the designation of a full-time, experienced and proactive faculty member to obstetrics teaching duty.[68] A further retrospective cohort study reported an increase in forceps births and decrease in caesarean births in association with senior obstetric supervision of residents. However, the change was only apparent during daytime hours when senior obstetricians were present.[75]

Evidence level 2+

5.3. *Where should assisted vaginal birth take place?*

Non-rotational low-pelvic and lift out assisted vaginal births have a low probability of failure and most procedures can be conducted safely in a birth room.

C

Assisted vaginal births that have a higher risk of failure should be considered a trial and be attempted in a place where immediate recourse to caesarean birth can be undertaken.

C

A study in Scotland of 1021 singleton term operative births for fetal distress showed that a decision to delivery interval (DDI) of 15 minutes was an achievable target for non-rotational low-pelvic vacuum and forceps births performed in a labour room and there were no assisted vaginal birth failures.[6]

Evidence level 2+

Higher rates of failure are associated with:

- maternal BMI greater than 30
- short maternal stature
- estimated fetal weight of greater than 4 kg or a clinically big baby
- head circumference above the 95th percentile
- occipito–posterior position
- midpelvic birth or when one-fifth of the head is palpable per abdomen.

High maternal BMI greater than 30, short maternal stature, neonatal birth weight greater than 4 kg and occipito–posterior positions are all indicators of increased failure and require special consideration.[6,53,76–78] At midpelvic stations, particularly station 0 or where rotation is required, the biparietal diameter is above the level of the ischial spines and failure rates are higher. A neonatal head circumference above the 95th percentile has been shown to be more strongly associated with unplanned caesarean or assisted vaginal birth than birth weight.[79] Preliminary data suggest that this might be identifiable using intrapartum sonography and worthy of further research.[80]

Evidence level 2+

Operative births that are anticipated to have a higher rate of failure should be considered a trial and conducted in a place where immediate recourse to caesarean birth can be undertaken, such as an operating theatre. There is little evidence of increased maternal or neonatal morbidity following failed assisted vaginal birth compared to immediate caesarean birth where immediate recourse to caesarean birth is available.[81] A study of 3189 women in the US reported that adverse neonatal outcomes following failed assisted vaginal birth were associated with non-reassuring fetal heart rate recordings and when these cases were removed, there was no association between a failed attempt at assisted vaginal birth and adverse neonatal outcomes.[82]

Evidence level 2+

The decision to transfer a woman to an operating theatre needs to take account of the time associated with transfer which may affect the neonatal outcome. Two retrospective studies compared assisted vaginal birth in the labour room with births in an operating theatre.[6,83] A study of 229 operative births for all indications had a DDI of 20 minutes for births in the room and 59 minutes for births in theatre.[83] A study of 1021 singleton term operative births for fetal distress showed that a DDI of 15 minutes is an achievable target in the labour room, whereas 30 minutes is the average DDI in theatre.[6] There were no statistically significant differences in the neonatal outcomes in either study in relation to short and longer DDIs. Therefore, the risks of unsuccessful assisted vaginal birth in the labour room should be balanced with the risks associated with the transfer time for birth in an operating theatre.

Evidence level 2+

5.4. *What instruments should be used for assisted vaginal birth?*

The operator should choose the instrument most appropriate to the clinical circumstances and their level of skill. ✓

Operators should be aware that forceps and vacuum extraction are associated with different benefits and risks; failure to complete the birth with a single instrument is more likely with vacuum extraction, but maternal perineal trauma is more likely with forceps. A

Operators should be aware that soft cup vacuum extractors have a higher rate of failure but a lower incidence of neonatal scalp trauma. A

Rotational births should be performed by experienced operators; the choice of instrument depending on the clinical circumstances and expertise of the individual. The options include Kielland's rotational forceps, manual rotation followed by direct traction forceps or vacuum, and rotational vacuum extraction. C

There have been no recent RCTs comparing vacuum and forceps, but a Cochrane systematic review evaluating 10 existing trials involving 2923 nulliparous and multiparous women reports the relative merits and risks of vacuum and forceps as outlined below in Table 4.[84]

Evidence level 1++

Vacuum failure rates of 17% to 36% have been reported in three RCTs comparing different vacuum devices. In one trial, including 194 women, the failure rate with the Kiwi™ OmniCup was 34% compared with 21% with the standard cup (aOR 2.3, 95% CI 1.01–5.0), increasing the sequential use of instruments to 22% and 10%, respectively.[85] In the second trial, including 404 women, the failure rate for occipito–

Evidence level 1+

Table 4. Vacuum extraction as compared with forceps assisted birth

More likely to fail at achieving vaginal birth	OR 1.7; 95% CI 1.3–2.2
More likely to be associated with cephalhaematoma	OR 2.4; 95% CI 1.7–3.4
More likely to be associated with retinal haemorrhage	OR 2.0; 95% CI 1.3–3.0
More likely to be associated with maternal worries about baby	OR 2.2; 95% CI 1.2–3.9
Less likely to be associated with significant maternal perineal and vaginal trauma	OR 0.4; 95% CI 0.3–0.5
No more likely to be associated with birth by caesarean birth	OR 0.6; 95% CI 0.3–1.0
No more likely to be associated with low 5 min Apgar scores	OR 1.7; 95% CI 1.0–2.8
No more likely to be associated with the need for phototherapy	OR 1.1; 95% CI 0.7–1.8

anterior births was 26% compared with 17% with the conventional cup (RR 1.55, 95% CI 1.00–2.40).[86] Failure of vacuum birth was three to four times more likely with a fetal malposition. A trial of 666 women in France comparing the metal vacuum with the disposable iCup™ reported higher failure with the disposable cup (35.6% versus 7.1%; $P < 0.0001$).[87] A further trial in Papua New Guinea reported low rates of vacuum failure of 2/100 for the Kiwi™ Omnicup and 6/100 for the Bird metal cup.[88] A prospective cohort study of 1000 vacuum-assisted births with the Kiwi™ OmniCup reported a failure rate of 12.9%.[89]

Evidence level 1+

A Cochrane review of nine RCTs involving 1368 women showed that soft vacuum extractor cups compared with rigid cups are associated with a higher rate of failure (OR 1.6, 95% CI 1.2–2.3), but a lower incidence of neonatal scalp trauma (OR 0.4, 95% CI 0.3–0.6).[90] An updated Cochrane review places a greater emphasis on choosing an appropriate instrument based on differing risks and benefits.[91]

Evidence level 1++

Birth by vacuum and forceps birth can be associated with significant maternal complications. Two maternal deaths have been described in association with tearing of the cervix at vacuum birth and a further maternal death following uterine rupture in association with forceps birth.[92,93] Vacuum and forceps birth are associated with a higher incidence of episiotomy, pelvic floor tearing, levator ani avulsion and obstetric anal sphincter injury (OASI) than spontaneous vaginal birth. Symptoms associated with pelvic floor trauma include pain, dyspareunia, and urinary and bowel incontinence.[94–100] However, a longitudinal prospective cohort study nested with a two-centre RCT of routine versus restrictive episiotomy for assisted vaginal birth reported that pelvic floor morbidities associated with assisted vaginal birth are often as prevalent, if not more prevalent, in the third trimester of pregnancy than postpartum.[101] This suggests that much of the pelvic floor morbidity reported by women in the weeks and months after an assisted vaginal birth may not be causally related to the procedure. A follow-up study of an RCT comparing vacuum and forceps reported no significant differences in bowel or urinary dysfunction at 5 years.[102]

Evidence level 2+

Birth by vacuum and forceps can be associated with significant perinatal complications. Neonatal intracranial and subgaleal haemorrhage are life-threatening complications of particular concern.[9,103] In a review of 583 340 liveborn singleton infants born to nulliparous women, the rate of subdural or cerebral haemorrhage in vacuum births (1 in 860) did not differ significantly from that associated with forceps use (1 in 664) or caesarean birth during labour (1 in 954). However, risks increased significantly among babies exposed to sequential instrument use with both vacuum and forceps (1 in 256).[9]

Evidence level 1+

Risk-based information can be summarised as follows:[61]

Maternal outcomes:

- Episiotomy; vacuum, 50–60%; and forceps, more than or equal to 90%.
- Significant vulvo–vaginal tear; vacuum, 10%; and forceps, 20%.
- OASI; vacuum, 1–4%; and forceps, 8–12%.
- Postpartum haemorrhage; vacuum and forceps, 10–40%.
- Urinary or bowel incontinence; common at 6 weeks, improves over time.

Perinatal outcomes:

- Cephalhaematoma; predominantly vacuum, 1–12%.
- Facial or scalp lacerations; vacuum and forceps, 10%.
- Retinal haemorrhage; more common with vacuum than forceps, variable 17–38%.
- Jaundice or hyperbilirubinaemia; vacuum and forceps, 5–15%.
- Subgaleal haemorrhage; predominantly vacuum, 3 to 6 in 1000.
- Intracranial haemorrhage; vacuum and forceps, 5 to 15 in 10 000.
- Cervical spine injury; mainly Kiellands rotational forceps, rare.
- Skull fracture; mainly forceps, rare.
- Facial nerve palsy; mainly forceps, rare.
- Fetal death; very rare.

The 'Odón' device is a new low-cost instrument designed for ease of use with minimal training in low resource settings. The World Health Organization is implementing a three-phased study protocol but until the device has been fully evaluated it cannot be recommended for routine use.[104]

Evidence level 2+

To date, there have been no randomised trials comparing alternative techniques for rotational assisted vaginal birth. Rotational birth with the Kielland's forceps carries additional risks, such as cervical spine injury, and requires specific expertise and training. Alternatives to Kielland's rotational forceps include manual rotation followed by direct traction forceps or vacuum extraction and rotational vacuum birth.

A meta-analysis of 23 studies of rotational assisted vaginal births reported that Kielland's forceps are less likely to fail (RR 0.32, 95% CI 0.14–0.76) and less likely to cause neonatal trauma (RR 0.62, 95% CI 0.46–0.85) when compared with rotational vacuum birth.[105] A prospective cohort study of 381 women undergoing rotational assisted vaginal birth compared Kielland's forceps with manual rotation or direct forceps and rotational vacuum. Maternal and perinatal outcomes are comparable with few serious adverse outcomes, but the use of sequential instruments is less with manual rotation or direct forceps than with rotational vacuum (0.6% versus 36.9%; OR 0.01, 95% CI 0.002–0.09).[106] In a prospective cohort study of women with complex births transferred to theatre in the second stage of labour, attempted forceps were more likely to result in completed vaginal birth than attempted vacuum (63% versus 48%; $P < 0.01$).[50] A number of retrospective cohort studies have evaluated the safety of Kielland's forceps births and reported high success rates (90–95%) and low morbidity in settings with experienced operators.[107–113]

Evidence level 2+

Enhanced skills in this area may reduce the need for second stage caesarean births and training should be encouraged for trainees, particularly those embarking on the advanced labour ward Advanced Training Skills Modules. The operator should choose the best approach within their expertise.

5.5. *When should vacuum-assisted birth be discontinued and how should a discontinued vacuum procedure be managed?*

Discontinue vacuum-assisted birth where there is no evidence of progressive descent with moderate traction during each pull of a correctly applied instrument by an experienced operator. ✓

Complete vacuum-assisted birth in the majority of cases with a maximum of three pulls to bring the fetal head on to the perineum. Three additional gentle pulls can be used to ease the head out of the perineum. ✓

If there is minimal descent with the first two pulls of a vacuum, the operator should consider whether the application is suboptimal, the fetal position has been incorrectly diagnosed or there is cephalopelvic disproportion. Less experienced operators should stop and seek a second opinion. Experienced operators should re-evaluate the clinical findings and either change approach or discontinue the procedure. ✓

Discontinue vacuum-assisted birth if there have been two 'pop-offs' of the instrument. Less experienced operators should seek senior support after one 'pop-off' to ensure the woman has the best chance of a successful assisted vaginal birth. ✓

The rapid negative pressure application for vacuum-assisted birth is recommended as it reduces the duration of the procedure with no difference in maternal and neonatal outcomes. ✓

The use of sequential instruments is associated with an increased risk of trauma to the infant. However, the operator needs to balance the risks of a caesarean birth following failed vacuum extraction with the risks of forceps birth following failed vacuum extraction. B

Obstetricians should be aware of the increased neonatal morbidity following failed vacuum-assisted birth and/or sequential use of instruments and should inform the neonatologist when this occurs to ensure appropriate management of the baby. ✓

Obstetricians should be aware of the increased risk of OASI following sequential use of instruments. C

The procedural aspects of assisted vaginal birth are difficult to research and guidance relies primarily on expert opinion and consensus from specialists in the field. Vacca[114] has emphasised the importance of clinical training and good technique for vacuum-assisted birth. Vacca recommends up to three pulls to bring the vertex onto the pelvic floor and up to three additional pulls to ease the head over the perineum where most resistance is encountered. An episiotomy should be performed if the perineum is very

Evidence level 4

resistant. Vacca warns against considering a'pop-off' to be a safety feature of the device and highlights the danger of a fetal vascular injury if a 'pop off' occurs at full traction during descent of the head.[66,114] Bahl et al.[64] describes a detailed skills taxonomy for non-rotational vacuum birth based on qualitative analysis of interviews and video recordings from a group of experts. The advice is that vacuum birth should be completed within three to four contractions. [Appendix 3]

Evidence level 4

Accurate instrument placement will influence the probability of success and the risk of maternal and neonatal trauma. An observational study nested within an RCT of 478 nulliparous women reported that suboptimal instrument placement is associated with an increased risk of neonatal trauma (OR 4.25, 95% CI 1.85–9.72), use of sequential instruments (OR 3.99, 95% CI 1.94–8.23) and caesarean birth for failed assisted vaginal birth (OR 3.81, 95% CI 1.10–13.2).[115]

Evidence level 2+

A multicentre prospective cohort study of 3594 low or outlet vacuum births reported a 5.8% failure rate. An increasing number of 'pop-offs' is associated with failed assisted vaginal birth (OR 3.58, 95% CI 2.22–5.77 for two 'pop-offs' versus no 'pop-offs') and duration of application is associated with an increased risk of the composite neonatal adverse outcome (OR 6.9, 95% CI 3.58–11.79 for more than 12 minutes duration versus 0–2 minutes).[116]

Evidence level 2+

A Cochrane review including two RCTs of 754 women found no significant difference in detachment rate, low Apgar score, scalp trauma, cephalhaematoma and number of tractions comparing rapid to stepwise (0–2 kg per 2 minutes until 0–8 kg) increments in pressure. There was a significant reduction in the time between applying the cup and birth with a median difference of –4.4 minutes (95% CI –4.8 to –4.0) for the large trial of 660 participants.[117]

Evidence level 1+

Where available, the operator should be aware of the manufacturer's recommendations for the chosen instrument.

The use of outlet or low-cavity forceps following failed vacuum extraction may be judicious in avoiding a potentially complex caesarean birth. Caesarean birth in the second stage of labour is associated with an increased risk of major obstetric haemorrhage, prolonged hospital stay and admission of the baby to the neonatal unit compared with completed assisted vaginal birth.[53,57]

Evidence level 2++

This must be balanced with the increased risk of neonatal trauma associated with sequential use of instruments (risk of intracranial haemorrhage, 1 in 256 births for two instruments versus 1 in 334 for failed forceps proceeding to caesarean birth).[9] A population-based retrospective analysis of 12 014 739 live births in the US reported that sequential use of vacuum and forceps compared with forceps alone is associated with an increased risk of need for mechanical ventilation with an aOR of 2.22 (95% CI 1.24–3.97). The risk of intracranial haemorrhage, retinal haemorrhage and feeding difficulty is also greater with the sequential use of instruments.[118]

Evidence level 2+

A population-based follow-up study of 7987 neonates who were born by attempted vacuum extraction of whom 245 (3.1%) had a failed assisted vaginal birth demonstrated no increased risk of long-term neurological morbidity up to 18 years of age in association with failed vacuum birth.[119]

Evidence level 2+

Neonatologists and midwives assessing the neonate following a failed attempt at vacuum birth, particularly where there have been multiple pulls, 'pop-offs' or use of more than one instrument, need to monitor for signs of traumatic injury which may not be immediately apparent at the time of birth.[5,9]

The use of sequential instruments has been associated with an increase in the incidence of third- and fourth-degree tears in a cohort study of 1360 nulliparous women in the UK (OASI, 17.4% for sequential versus 8.4% for forceps alone; OR 2.1, 95% CI 1.2–33).[120] A study of 760 sequential instrument births in the US reported a similar increase compared with vacuum alone (OR 2.77, 95% CI 2.36–3.26) and compared with forceps alone (OR 1.39, 95% CI 1.08-1.64).[121]

Evidence level 2+

The sequential use of instruments should not be attempted by an inexperienced operator without direct supervision and should be avoided whenever possible.

5.6. *When should attempted forceps birth be discontinued and how should a discontinued forceps procedure be managed?*

Discontinue attempted forceps birth where the forceps cannot be applied easily, the handles do not approximate easily or if there is a lack of progressive descent with moderate traction. B

Discontinue rotational forceps birth if rotation is not easily achieved with gentle pressure. B

Discontinue attempted forceps birth if birth is not imminent following three pulls of a correctly applied instrument by an experienced operator. B

If there is minimal descent with the first one or two pulls of the forceps, the operator should consider whether the application is suboptimal, the position has been incorrectly diagnosed or there is cephalopelvic disproportion. Less experienced operators should stop and seek a second opinion. Experienced operators should re-evaluate the clinical findings and either change approach or discontinue the procedure. ✓

Obstetricians should be aware of the potential neonatal morbidity following a failed attempt at forceps birth and should inform the neonatologist when this occurs to ensure appropriate care of the baby. ✓

Obstetricians should be aware of the increased risk of fetal head impaction at caesarean birth following a failed attempt at forceps birth and should be prepared to disimpact the fetal head using recognised manoeuvres. ✓

A prospective cohort study of 393 women experiencing rotational or midpelvic assisted birth in the second stage of labour reported an increased risk of neonatal trauma and admission to the special care baby unit following excessive pulls (more than three pulls). The risk was further increased where birth was completed by caesarean birth following a failed attempt at assisted vaginal birth.[71] At 5 years of follow-up, there was no difference in the neurodevelopmental outcomes of babies born by assisted vaginal birth when compared to babies born by caesarean. The two cases of cerebral palsy did not have a causal relationship to the mode of birth and were born by caesarean.[8]

Evidence level 2+

A multicentre prospective cohort study of 1731 low or outlet forceps births reported a 4.9% failure rate. An increasing number of pulls was associated with failed assisted vaginal birth (OR 3.24, 95% CI 1.59–6.61 for 3 or more pulls versus one) and duration of application was associated with an increased risk of the composite neonatal adverse outcome (OR 5.37, 95% CI 1.49–19.32 for greater than 12 minutes duration versus 0–2 minutes).[116]

Evidence level 2+

An observational study nested within an RCT of 478 nulliparous women reported that suboptimal instrument placement was more likely with forceps than vacuum and was associated with an increased risk of neonatal trauma (OR 4.25, 95% CI 1.85–9.72) and caesarean birth for failed assisted vaginal birth (OR 3.81, 95% CI 1.10–13.2).[115]

Evidence level 2+

The bulk of malpractice litigation results from failure to discontinue the procedure at the appropriate time, particularly the failure to eschew prolonged, repeated or excessive traction efforts in the presence of poor progress. Adverse events, including unsuccessful forceps or vacuum, birth trauma, term baby admitted to the neonatal unit, low Apgar scores (less than 7 at 5 minutes) and cord arterial pH less than 7.10 should trigger an incident report and review if necessary, as part of effective risk management processes.[122]

Evidence level 4

Failed forceps birth is associated with excessive pulls (more than three) and prolonged application of the instrument (greater than 12 minutes), which in turn is associated with an increased risk of serious neonatal traumatic injury.[71,116] Neonatologists and midwives assessing the neonate following a failed attempt at forceps birth, particularly where there have been multiple pulls or use of more than one instrument, need to monitor for signs of traumatic injury, which may not be immediately apparent at the time of birth.

Evidence level 2+

It is good practice to disimpact the fetal head in advance of caesarean birth where attempted forceps birth has been discontinued. Obstetricians should be aware of the increased risk of fetal head impaction and consider manoeuvres to deliver the head safely.[123] Further research is required to evaluate the effectiveness of alternative manoeuvres and medical devices for relieving fetal head impaction at caesarean birth.

5.7. *What is the role of episiotomy in preventing maternal pelvic floor morbidity at assisted vaginal birth?*

Mediolateral episiotomy should be discussed with the woman as part of the preparation for assisted vaginal birth. ✓

In the absence of robust evidence to support either routine or restrictive use of episiotomy at assisted vaginal birth, the decision should be tailored to the circumstances at the time and the preferences of the woman. The evidence to support use of mediolateral episiotomy at assisted vaginal birth in terms of preventing OASI is stronger for nulliparous women and for birth via forceps.

B

When performing a mediolateral episiotomy the cut should be at a 60 degree angle initiated when the head is distending the perineum.

B

A two-centre RCT including 200 nulliparous women failed to provide conclusive evidence that a policy of routine episiotomy is better or worse than a restrictive policy at assisted vaginal birth. The incidence of OASI was similar in both groups (8.1% in 99 women randomised to routine episiotomy and 10.9% in 101 women randomised to restrictive use; OR 0.72, 95% CI 0.28–1.87).[124]

Evidence level 1+

A large observational study from the Netherlands of 28 732 assisted vaginal births concluded that mediolateral episiotomy is protective against OASI in both vacuum extraction (9.4% versus 1.4%; OR 0.11, 95% CI 0.09–0.13) and forceps birth (22.7% versus 2.6%; OR 0.28, 95% CI 0.13– 0.63).[125] A further retrospective cohort study from the Netherlands of 2861 assisted vaginal births reported a 5.7% frequency of OASI and six-fold reduction in OASI with the use of mediolateral episiotomy.[126] In a UK prospective study of 1360 assisted vaginal births, episiotomy did not appear to protect against OASI in vacuum extraction (4.3% with episiotomy versus 5.5% without episiotomy) or forceps birth (11.7% versus 10.6%). However, episiotomy was associated with a greater incidence of postpartum haemorrhage (28.4% versus 18.4%; OR 1.72, 95% CI 1.21–2.45).[94] A large UK-based retrospective cohort study calculated the risk of OASIS based on 1.2 million primiparous vaginal deliveries as follows: 1.89 (95% CI 1.74-2.05) fold greater in ventouse without episiotomy and 6.53 times greater in forceps deliveries without episiotomy (95% CI 5.57-7.64).[127,128](2015)

Evidence level 1+ to 2–

There have been two systematic reviews of the evidence for episiotomy use at vacuum birth each including 15 observational studies.[129,130] The Danish group[129] interpreted the data as showing that mediolateral or lateral episiotomy is protective against OASI in nulliparous women and should be considered, while the Israeli group[130] reported that episiotomy in vacuum birth does not appear to be of benefit and might even increase maternal morbidity in parous women. A non-significant relationship was shown between mediolateral episiotomy and obstetric anal sphincter injuries (OASIS) in nulliparous women (OR 0.68, 95% CI 0.43–1.07; six studies), whereas an increased risk was demonstrated in parous women (OR 1.27, 95% CI 1.05–1.53; two reports).

Evidence level 1+

6. Aftercare following assisted vaginal birth

6.1. *Should prophylactic antibiotics be given?*

A single prophylactic dose of intravenous amoxicillin and clavulanic acid should be recommended following assisted vaginal birth as it significantly reduces confirmed or suspected maternal infection compared to placebo.

A

Good standards of hygiene and aseptic techniques are recommended. ✓

A Cochrane review included only one randomised trial of 393 participants. There were seven women with endometritis in the group given no antibiotic and none in the prophylactic antibiotic group (RR 0.07, 95% CI 0.00–1.21).[131] There is a similar lack of evidence for the role of antibiotics at normal birth or after repair of episiotomy.[132] The use of antibiotics in labour and after birth is common and yet good antibiotic stewardship is needed to prevent antimicrobial resistance. High-quality evidence is required to inform clinical practice. Evidence level 1++

The ANODE trial was a multicentre, randomised, blinded, controlled trial done at 27 hospital obstetric units in the UK.[133] Women who had undergone birth by forceps or vacuum at 36 weeks or greater gestation, with no indication for ongoing prescription of antibiotics in the postpartum period and no contraindications to prophylactic amoxicillin and clavulanic acid, were randomly assigned (1:1) to receive a single intravenous dose of prophylactic amoxicillin and clavulanic acid or placebo. The proportion of women who had overall primary outcome events was higher than anticipated (486 [15%] of 3225). A significantly smaller number of women allocated to the amoxicillin and clavulanic acid group had a confirmed or suspected infection (180 [11%] of 1619) than women who were allocated to the placebo group (306 [19%] of 1606; RR 0·58, 95% CI 0·49–0·69; $P < 0·0001$). The ANODE trial showed that women who received a single prophylactic dose of intravenous amoxicillin and clavulanic acid a median of 3 hours after assisted vaginal birth were significantly less likely to have a confirmed or suspected maternal infection than women who received placebo. They were also significantly less likely to experience a range of other secondary outcomes, including perineal wound infection, perineal pain, and perineal wound breakdown. They were less likely to report any primary care physician or home visits or any hospital outpatient visits in relation to concerns about their perineum compared with the placebo group. The ANODE trial therefore provides evidence of benefit of prophylactic antibiotic administration after assisted vaginal birth, with few observed adverse events in relation to the intervention.

Obstetricians should practice good aseptic techniques and use personal protection equipment (for example, gloves and aprons, or surgical gowns) to reduce infection and prevent contamination.[22] Evidence level 4

6.2. *Should thromboprophylaxis be given?*

Reassess women after assisted vaginal birth for venous thromboembolism risk and the need for thromboprophylaxis. D

There are a lack of data to evaluate the independent risk of assisted vaginal birth for thromboembolism. However, many identified risk factors for thromboembolism, such as prolonged labour and immobility, are also associated with operative births. Therefore, women should be reassessed after assisted vaginal birth for risk factors for venous thromboembolism and prescribed thromboprophylaxis accordingly. The obstetrician should refer to the RCOG Green-top Guideline No. 37a *Reducing the risk of Venous Thromboembolism during the Pregnancy and the Puerperium*.[134] Evidence level 4

6.3. *What analgesia should be given after birth?*

In the absence of contraindications, women should be offered regular nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol routinely. A

NSAIDs are effective for pain relief for perineal, vaginal and pelvic discomfort. Oral NSAIDs, such as diclofenac or ibuprofen, have been shown to be beneficial for perineal pain and provide better analgesia than paracetamol or placebo. Paracetamol has a good safety record in the postnatal period and is used regularly in postoperative pain.[135] Evidence level 1++

6.4. *What precautions should be taken for care of the bladder after birth?*

Women should be educated about the risk of urinary retention so that they are aware of the importance of bladder emptying in the postpartum period. ✓

The timing and volume of the first void urine should be monitored and documented. C

A post void residual should be measured if urinary retention is suspected. ✓

Recommend that women who have received regional analgesia for a trial of assisted vaginal birth in theatre have an indwelling catheter in situ after the birth to prevent covert urinary retention. This should be removed according to the local protocol. ✓

Offer women physiotherapy-directed strategies to reduce the risk of urinary incontinence at 3 months. B

Assisted vaginal birth, prolonged labour and epidural analgesia are associated with an increased risk of postpartum urinary retention (PUR), which can be associated with long-term bladder dysfunction.[136] There is considerable variation in practice in postpartum bladder management in the UK.[137] However, at a minimum, the first void should be measured and if retention is a possibility, a post void residual should be measured to ensure that retention does not go unrecognised.[138] Evidence level 2+

The use of bladder scanning, as an alternative to catheterisation, to measure residual urine can be used if appropriate training has been undertaken, particularly to avoid confusion between the postpartum uterus and the bladder.[139] Evidence level 2++

There is one small 'before and after' trial that suggests that systematic intermittent bladder catheterisation at 2 hours post birth reduces the risk of covert PUR after assisted vaginal birth from 15/23 (65%) in the observational group to 2/11 (18%) ($P = 0.02$). This trial is small and subject to bias in the 'before and after' design.[140] Evidence level 2–

Women who have had regional analgesia for a trial of assisted vaginal birth should be offered an indwelling catheter for 6–12 hours after birth (in keeping with the local protocol) to prevent asymptomatic bladder overfilling, followed by fluid balance charts to ensure good voiding volumes. ✓

Further good quality studies are required to evaluate strategies for the prevention and management of PUR.

Urinary incontinence is common in late pregnancy and after birth. A Cochrane review of pelvic floor muscle exercise in antenatal and postnatal women concluded that there is uncertainty about the benefit of pelvic floor muscle exercise to treat urinary incontinence in postnatal women.[141] However, one trial that involved women with assisted vaginal birth demonstrated that a physiotherapist delivering intervention designed to prevent urinary incontinence, reduced incontinence at 3 months from 38.4% to 31.0% in a group of women that had had assisted vaginal birth and/or a baby over 4 kg.[142] The effect was reduced at 12 months.

Evidence level 1+

6.5. *How can psychological morbidity be reduced for the woman?*

Shared decision making, good communication, and positive continuous support during labour and birth have the potential to reduce psychological morbidity following birth. ✓

Review women before hospital discharge to discuss the indication for assisted vaginal birth, management of any complications and advice for future births. Best practice is where the woman is reviewed by the obstetrician who performed the procedure. ✓

Offer advice and support to women who have had a traumatic birth and wish to talk about their experience. The effect on the birth partner should also be considered. ✓

Do not offer single session, high-intensity psychological interventions with an explicit focus on 'reliving' the trauma. ✓

Offer women with persistent post-traumatic stress disorder (PTSD) symptoms at 1 month referral to skilled professionals as per the NICE guidance on PTSD. D

Factors that influence the ongoing psychological wellbeing of a woman after assisted vaginal birth are complex. A large prospective study from the Norwegian Mother and Child Cohort study reported that mode of birth was not significantly associated with a change in emotional distress (as measured by the eight-item dichotomised version of the Symptoms Check List) from 30 weeks of gestation to 6 months postpartum or with the presence of emotional distress at 6 months. The biggest predictor of emotional distress postnatally was antenatal emotional distress.[143]

Evidence level 2+

However, in the UK national maternity survey in 2010, the risk of reduced postnatal health wellbeing was higher in women who gave birth with the aid of forceps compared with an unassisted birth; with a higher rate of women reporting two or more PTSD-type symptoms at 3 months (25/359 [7%] versus 93/3275 [3%]; OR 4.89, 95% CI 2.68–8.9). The survey also concluded that 42% of women that had an assisted vaginal birth did not talk to a healthcare professional about their birth and 43% of these women would have liked to.[144]

Evidence level 2+

Follow-up of a cohort at 3 years following operative birth reported that 50% of women did not plan on having a further child and almost one-half of these women reported fear of childbirth as the main reason for avoiding pregnancy.[8]

Evidence level 2+

The association between assisted vaginal birth and PTSD is complex and studies have had conflicting results. A systematic review concluded that assisted vaginal birth is one of a number of risk factors for PTSD and proposes a model for consideration that includes predisposing risk factors, triggering factors and coping factors.[145]

Evidence level 2+

A further cohort study suggested that the key associations with a traumatic birth are lack of control and lack of choice for pain relief. This highlights the importance of shared decision making, consideration for pain relief, and the value of non-technical skills in conducting an operative birth and in reducing the impact of the birth on the psychological wellbeing of the woman and her family.[146]

Evidence level 2+

Several studies have looked at debriefing approaches to reducing psychological morbidity following childbirth. A Cochrane review concluded that there is little or no evidence to support either a positive or adverse effect of psychological debriefing for the prevention of psychological trauma in women following childbirth.[147] Nonetheless, women report the need for a review following birth to discuss the management of any complications and the implications for future births.[144]

Evidence level 2–

The optimal timing, setting and healthcare professional for post-birth review require further evaluation. The obstetrician should refer to the NICE guideline on postnatal mental health and PTSD, and refer women with continuing severe symptoms to relevant expertise, such as psychology, as recommended in the guideline.[138]

Evidence level 4

6.6. *What information should women be given for future births?*

Inform women that there is a high probability of a spontaneous vaginal birth in subsequent labours following assisted vaginal birth.

B

Individualise care for women who have sustained a third- or fourth-degree perineal tear, or who have ongoing pelvic floor morbidity.

✓

Women who have experienced an uncomplicated assisted vaginal birth should be encouraged to aim for a spontaneous vaginal birth in a subsequent pregnancy as there is a high chance of success. A population-based register study from Sweden found that 90% of women who had a ventouse-assisted birth with their first baby had a spontaneous or unassisted birth with their second baby.[7] Although the risk of a further operative birth is higher than for women who had an unassisted birth in their first pregnancy, the absolute risk is low. The likelihood of achieving a spontaneous vaginal birth in a subsequent pregnancy is approximately 80% for women who have required more complex assisted vaginal births in theatre.[8] This discussion should take place at the earliest opportunity as there is evidence to suggest that women decide soon after birth.[148]

Evidence level 2+

The future plan of care should be reviewed carefully with women who have experienced a third- or fourth-degree tear, particularly if they are symptomatic, as they may be at increased risk of further anorectal damage with a subsequent birth. Women should be counselled regarding the risk of recurrence and implications for future childbirth as per the RCOG guideline.[128]

Evidence level 2+

7. Governance issues

7.1. What type of documentation should be completed for assisted vaginal birth?

Documentation for assisted vaginal birth should include detailed information on the assessment, decision making and conduct of the procedure, a plan for postnatal care and sufficient information for counselling in relation to subsequent pregnancies. Use of a standardised proforma is recommended. ✓

Paired cord blood samples should be processed and recorded following all attempts at assisted vaginal birth. ✓

Adverse outcomes, including failed assisted vaginal birth, major obstetric haemorrhage, OASI, shoulder dystocia and significant neonatal complications should trigger an incident report as part of effective risk management processes. ✓

Like any clinical documentation, the documentation of the decision making and the conduct of the operative birth needs to include the key information to inform ongoing medical care of the woman and baby in the postnatal period, to enable debriefing, inform local audits and to inform decision making in subsequent births. An accurate record of the procedure must be completed including critical time points in the decision making, conduct and completion of the procedure. This is aided by standardised documentation, an example of which can be found in Appendix 2.

7.2. How should serious adverse events be dealt with?

Obstetricians should ensure that the ongoing care of the woman, baby and family are paramount. ✓

Obstetricians have a duty of candour; a professional responsibility to be honest with patients when things go wrong. ✓

Obstetricians should contribute to adverse event reporting, confidential enquiries, and take part in regular reviews and audits. They should respond constructively to outcomes of reviews, taking necessary steps to address any problems and carry out further retraining where needed. ✓

Maternity units should provide a safe and supportive framework to support women, their families and staff when serious adverse events occur. ✓

Like all health professionals, obstetricians have a duty of candour; a professional responsibility to be open and honest with patients when things go wrong. This is described in the joint statement from eight regulators in the UK.[149]

Maternity units should provide a safe and supportive environment in which learning can take place from serious adverse events. Highly complex human factors are involved in assisted vaginal birth (and attempted assisted vaginal birth). An understanding of the interplay of these in adverse events is important. Not all serious adverse events are caused by failures in care.

8. Recommendations for future research

- What is the role of oxytocin in the second stage of labour in women using epidural analgesia?
- Should manual rotation be used for correction of fetal malposition early in the second stage of labour?
- What is the role of ultrasound to assess fetal head position prior to assisted vaginal birth?
- What is the best choice of instrument for rotational assisted vaginal birth?
- What manoeuvres can alleviate fetal head impaction at second stage caesarean birth?

9. Auditable topics

Maternity unit

- Proportion of assisted vaginal births; the UK average is between 10% and 15%.

Maternity unit and individual operator

- Proportion of unsuccessful assisted vaginal births.
- Proportion of sequential instrument use.
- Case notes review to audit appropriate care of women with failed assisted vaginal birth or sequential instrument use for:
    - When to use sequential instrument and when to discontinue.
    - Use of ultrasound scan to confirm fetal position.
- Proportion of third- and fourth-degree perineal tears (1–4% for vacuum and 8–12% for forceps).
- Proportion of neonatal morbidity (composite trauma, including subgaleal haemorrhage, brachial plexus injury, fracture, facial nerve palsy, or cerebral haemorrhage), low Apgar score less than 7 at 5 minutes and cord arterial pH less than 7.10 (refer RCOG consent).
- Proportion of documentation of written or verbal consent for assisted vaginal birth (100%).
- Proportion of written consent documented for trial of assisted vaginal birth in operating theatre (100%).
- Completeness of documentation (100%).

- Proportion of women after assisted vaginal birth receiving a postnatal review explaining the birth and discussing birth options in future pregnancy (100%).

10. Useful links and support groups

- Royal College of Obstetricians and Gynaecologists. London: RCOG; 2012.
- NHS Choices. [https://www.nhs.uk/conditions/pregnancy-and-baby/ventouse-forceps-delivery/].
- Tommy's. [https://www.tommys.org/pregnancy-information/labour-birth/assisted-birth].

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References

1. NHS Maternity Statistics, England 2016-17 [https://digital.nhs.uk/data-and-information/publications/statistical/nhs-maternity-statistics/2016-17]. last accessed 04 February 2020
2. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. *Cochrane Database Syst Rev* 2011;12:CD000331. Update 2018.
3. Hodnett ED, Downe S, Walsh D. Alternative versus conventional institutional settings for birth. *Cochrane Database Syst Rev* 2012;8:CD000012.
4. Spencer C, Murphy D, Bewley S. Caesarean section in the second stage of labour. *BMJ* 2006;333:613–4.
5. Demissie K, Rhoads GG, Smulian JC, Balasubramanian BA, Gandhi K, Joseph KS, et al. Operative vaginal delivery and neonatal and infant adverse outcomes: population based retrospective analysis. *BMJ* 2004;329:24–9.
6. Murphy DJ, Koh DKM. Cohort study of the decision to delivery interval and neonatal outcome for emergency operative vaginal delivery. *Am J Obstet Gynecol* 2007;196:145.
7. Elvander C, Cnattingius S. Outcome of attempted vaginal delivery after a previous vacuum extraction: a population-based study. *Acta Obstet Gynecol Scand* 2016;95:362–7.
8. Bahl R, Strachan B, Murphy DJ. Outcome of subsequent pregnancy three years after previous operative delivery in the second stage of labour: cohort study. *BMJ* 2004;328:311.
9. Towner D, Castro MA, Eby-Wilkens E, Gilbert WM. Effect of mode of delivery in nulliparaous women on neonatal intracranial injury. *N Engl J Med* 1999;341:1709–14.
10. Bohren MA, Hofmeyr GJ, Sakala C, Fukuzawa RK, Cuthbert A. Continuous support for women during childbirth. *Cochrane Database of Syst Rev* 2017;7:CD003766.
11. Wassen MM, Zuijlen J, Roumen FJ, Smits LJ, Marcus MA, Nijhuis JG. Early versus late epidural analgesia and risk of instrumental delivery in nulliparous women: a systematic review. *BJOG* 2011;118:655–61.
12. Gupta JK, Sood A, Hofmeyr GJ, Vogel JP. Position in the second stage of labour for women without epidural analgesia. *Cochrane Database Syst Rev* 2017;5:CD002006.
13. Epidural and Position Trial Collaborative Group. Upright versus lying down position in second stage of labour in nulliparous women with low dose epidural: BUMPES randomised controlled trial. *BMJ* 2017;359:j4471.
14. Kibuka M, Thornton JG. Position in second stage of labour for women with epidural analgesia. *Cochrane Database Syst Rev* 2017;2:CD008070.
15. Roberts CL, Torvaldsen S, Cameron CA, Olive E. Delayed versus early pushing in women with epidural analgesia: a systematic review and meta-analysis. *BJOG* 2004;111:1333–40.
16. Tuuli MG, Frey HA, Odibo AO, Macones GA, Cahill AG. Immediate compared with delayed pushing in the second stage of labour: a systematic review and meta-analysis. *Obstet Gynecol* 2012;120:660–8.
17. Torvaldsen S, Roberts CL, Bell JC, Raynes-Greenow CH. Discontinuation of epidural analgesia late in labour for reducing the adverse delivery outcomes associated with epidural analgesia. *Cochrane Database Syst Rev* 2004;4:CD004457.
18. Simmons SW, Cyna AM, Dennis AT, Hughes D. Combined spinal-epidural versus epidural analgesia in labour. *Cochrane Database Syst Rev* 2007;3:CD003401.

19. van der Vyver M, Halpern S, Joseph G. Patient-controlled epidural analgesia versus continuous infusion for labour analgesia: a meta-analysis. *Br J Anaesth* 2002;89:459–65.
20. Wong CA, Ratliff JT, Sullivan JT, Scavone BM, Toledo P, McCarthy RJ. A randomized comparison of programmed intermittent epidural bolus with continuous epidural infusion for labor analgesia. *Anesth Analg* 2006;102:904–9.
21. Costley PL, East CE. Oxytocin augmentation of labour in women with epidural analgesia for reducing operative deliveries. *Cochrane Database Syst Rev* 2013;7:CD009241.
22. National Institute for Health and Care Excellence. *Intrapartum care for healthy women and babies*. Clinical Guideline 190. London: NICE; 2017.
23. Cargill YM, MacKinnon CJ, Arsenault MY, Bartellas E, Daniels S, Gleason T, et al. Clinical Practice Obstetrics Committee. Guidelines for assisted vaginal birth. *J Obstet Gynaecol Can* 2004;26:747–61.
24. Shaffer BL, Cheng YW, Vargas JE, Caughey AB. Manual rotation to reduce caesarean delivery in persistent occiput posterior or transverse position. *J Matern Fetal Neonatal Med* 2011;24:65–72.
25. Le Ray C, Deneux-Tharaux C, Khireddine I, Dreyfus M, Vardon D, Goffinet F. Manual rotation to decrease operative delivery in posterior or transverse positions. *Obstet Gynecol* 2013;122:634–40.
26. Phipps H, de Vries B, Hyett J, Osborn DA. Prophylactic manual rotation for fetal malposition to reduce operative delivery. *Cochrane Database Syst Rev* 2014;12:CD009298.
27. Broberg J, Rees S, Jacob S, Drewes P, Wolsey B, Dayton L, et al. 90: A randomized controlled trial of prophylactic early manual rotation of the occiput posterior fetal head at the beginning of the second stage of labor vs. expectant management in nulliparas. *Am J Obstet Gynecol* 2016;214:S63.
28. Committee on Practice Bulletins—Obstetrics. ACOG Practice Bulletin No. 154: Operative Vaginal Delivery. *Obstet Gynecol* 2015;126:e56–65.
29. Bahl R, Murphy DJ, Strachan B. Decision-making in operative vaginal delivery: when to intervene, where to deliver and which instrument to use? Qualitative analysis of expert clinical practice. *Eur J Obstet Gynecol Reprod Biol* 2013;170:333–40.
30. Cheung YW, Hopkins LM, Caughey AB. How long is too long: Does a prolonged second stage of labor in nulliparous women affect maternal and neonatal morbidity? *Am J Obstet Gynecol* 2004;191:933–8.
31. Pavord S, Rayment R, Madan B, Cumming T, Lester W, Chalmers E, et al. on behalf of the Royal College of Obstetricians and Gynaecologists. Management of inherited bleeding disorders in pregnancy. Green-top Guideline No. 71. *BJOG* 2017;124:e193–e263.32.
32. Peters H, Francis K, Harding K, Tookey PA, Thorne C. Operative vaginal delivery and invasive procedures in pregnancy among women living with HIV. *Eur J Obstet Gynecol Reprod Biol* 2017;210:295–9.
33. National Institutes of Health. *Management of Hepatitis C: 2002*. National Institutes of Health Consensus Conference Statement. Bethesda, Maryland: NIH; 2002 [https://consensus.nih.gov/2002/2002hepatitisc200216html.htm].
34. Roberts IF, Stone M. Fetal hemorrhage: complication of vacuum extractor after fetal blood sampling. *Am J Obstet Gynecol* 1978;132:109.
35. Thiery M. Fetal hemorrhage following blood sampling and use of vacuum extractor. *Am J Obstet Gynecol* 1979;134:231.
36. Johanson RB, Pusey J, Livera N, Jones P. North Staffordshire/Wigan assisted delivery trial. *Br J Obstet Gynaecol* 1989;96:537–44.
37. Johanson RB, Rice C, Doyle M, Arthur J, Ibrahim J, Warwick A, et al. A randomised prospective study comparing the new vacuum extractor policy with forceps delivery. *Br J Obstet Gynaecol* 1993;100:524–30.
38. Esakoff T, Cheng Y, Snowden J, Caughey A. 819: Is operative vaginal delivery safe in the preterm fetus? *Am J Obstet Gynecol* 2013;208:S343.
39. Åberg K, Norman M, Ekéus C. Preterm birth by vacuum extraction and neonatal outcome: a population-based cohort study. *BMC Pregnancy and Childbirth* 2014;14:42.
40. Schwarzman P, Walfisch A, Wainstock T, Segal I, Landau D, Sheiner E. Vacuum extraction for the preterm newborn and the long-term neurological outcome. *Am J Obstet Gynecol* 2017;216:S549.
41. Ramphul M, Ooi PV, Burke G, Kennelly MM, Said SAT, Montgomery AA, et al. Instrumental delivery and ultrasound: a multicentre randomised controlled trial of ultrasound assessment of the fetal head position versus standard care as an approach to prevent morbidity at instrumental delivery. *BJOG* 2014;121:1029–1038.
42. Popowski T, Porcher R, Fort J, Javoise S, Rozenberg P. Influence of ultrasound determination of fetal head position on mode of delivery: a pragmatic randomized trial. *Ultrasound Obstet Gynecol* 2015;46:520–5.
43. Ramphul M, O'Brien Y, Murphy DJ. Strategies to enhance assessment of the fetal head position before instrumental delivery: a survey of obstetric practice in the United Kingdom and Ireland. *Eur J Obstet Gynecol Reprod Biol* 2012;165:181–8.
44. Ramphul M, Kennelly M, Murphy DJ. Establishing the accuracy and acceptability of abdominal ultrasound to identify the foetal head position in the second stage of labour: a validation study. *Eur J Obstet Gynecol Reprod Biol* 2012;164:35–9.
45. Sananes NP, Kasbaoui S, Severac F, Gaudineau A, Aïssi G, Favre R, et al. 96: Ultrasound measurement of the perineum-fetal head distance as a predictive factor of difficult vaginal operative delivery. *Am J Obstet Gynecol* 2017;216:S69.
46. Kasbaoui S, Séverac F, Aïssi G, Gaudineau A, Lecointre L, Akladios C, et al. Predicting the difficulty of operative vaginal delivery by ultrasound measurement of fetal head station. *Am J Obstet Gynecol* 2017;216:507.
47. Bultez T, Quibel T, Bouhanna P, Popowski T, Resche-Rigon M, Rozenberg P. Angle of fetal head progression measured using transperineal ultrasound as a predictive factor of vacuum extraction failure. *Ultrasound Obstet Gynecol* 2016;48:86–91.
48. Chan SW, Tulloch E, Cooper ES, Smith A, Wojcik W, Norman JE. Montgomery and informed consent: where are we now? *BMJ* 2017;357:j2224.
49. Clearkin L. Changes to the law on consent following Montgomery vs Lanarkshire Health Board. *Br J Hosp Med (Lond)* 2016;77:355–7.
50. Avasarala S, Mahendran M. A survey of women's experiences following instrumental vaginal delivery. *J Obstet Gynaecol* 2009;29:504–6.
51. Royal College of Obstetricians and Gynaecologists. *Obtaining Valid Consent*. Clinical Governance Advice No. 6. London: RCOG; 2015.
52. Royal College of Obstetricians and Gynaecologists. *Obtaining Valid Consent to Participate in Perinatal Research Where Consent is Time critical*. Clinical Governance Advice No. 6a. London: RCOG; 2016.

53. Murphy DJ, Liebling RE, Verity L, Swingler R, Patel R. Early maternal and neonatal morbidity associated with operative delivery in the second stage of labour: a cohort study. *Lancet* 2001;358:1203–7.
54. Bahl R, Strachan B, Murphy DJ. Pelvic floor morbidity at 3 years after instrumental delivery and cesarean section in the second stage of labor and the impact of a subsequent delivery. *Am J Obstet Gynecol* 2005;192:789–94.
55. Shmueli A, Salman L, Ashwal E, Hiersch L, Gabbay-Benziv R, Yogev Y, et al. Perinatal outcomes of vacuum assisted versus cesarean deliveries for prolonged second stage of delivery at term. *J Matern Fetal Neonatal Med* 2016;30:886–9.
56. Bahl R, Patel RR, Swingler R, Ellis N, Murphy DJ. Neurodevelopmental outcome at 5 years after operative delivery in the second stage of labor: a cohort study. *Am J Obstet Gynecol* 2007;197:147.
57. Walsh C, Robson M, McAuliffe F. 647: Neonatal morbidity and mortality of operative vaginal delivery: a 10-year study of 82,000 infants. *Am J Obstet Gynecol* 2012;206:S290.
58. Contag SA, Clifton RG, Bloom SL, Spong CY, Varner MW, Rouse DJ, et al. Neonatal outcomes and operative vaginal delivery versus cesarean delivery. *Am J Perinatol* 2010;27:493–9.
59. Muraca GM, Sabr Y, Lisonkova S, Skoll A, Brant R, Cundiff GW, et al. Perinatal and maternal morbidity and mortality after attempted operative vaginal delivery at midpelvic station. *CMAJ* 2017;189:E764–72.
60. Ducarme G, Hamel JF, Bouet PE, Legendre G, Vandenbroucke L, Sentilhes L. Maternal and neonatal morbidity after attempted operative vaginal delivery according to Fetal head station. *Obstet Gynecol* 2015;126:521–9.
61. Royal College of Obstetricians and Gynaecologists. *Operative vaginal delivery*. Consent Advice No. 11. London: RCOG; 2010.
62. Johnstone T. Minimizing risk: obstetric skills training. *Clinical Risk* 2003;9:99–102.
63. Bahl R, Murphy DJ, Strachan B. Non-technical skills for obstetricians conducting forceps and vacuum deliveries: qualitative analysis by interviews and video recordings. *Eur J Obstet Gynecol Reprod Biol* 2010;150:147–51.
64. Bahl R, Murphy DJ, Strachan B. Qualitative analysis by interviews and video recordings to establish the components of a skilled low-cavity non-rotational vacuum delivery. *BJOG* 2009;116:319–26.
65. Bahl R, Murphy DJ, Strachan B. Qualitative analysis by interviews and video recordings to establish the components of a skilled rotational forceps delivery. *Eur J Obstet Gynecol Reprod Biol* 2013;170:341–7.
66. Attilakos G, Draycott T, Gale A, Siassakos D, Winter C editors. *ROBuST: RCOG Operative Birth Stimulation Training: Course Manual*. Cambridge: Cambridge University Press; 2014.
67. Royal College of Obstetricians and Gynaecologists. *OSATS*. London; RCOG: 2018. [https://www.rcog.org.uk/en/careers-training/about-specialty-training-in-og/assessment-and-progression-through-training/workplace-based-assessments/osats/]
68. Solt I, Jackson S, Moore T, Rotmensch S, Kim MJ. Teaching forceps: the impact of proactive faculty. *Am J Obstet Gynecol* 2011;204:448.
69. Lane S, Weeks A, Scholefield H, Alfirevic Z. Monitoring obstetricians' performance with statistical process control charts. *BJOG* 2007;114:614–8.
70. Sau A, Sau M, Ahmed H, Brown R. Vacuum extraction: is there any need to improve the current training in the UK? *Acta Obstet Gynecol Scand* 2004;83:466–70.
71. Murphy DJ, Liebling RE, Patel R, Verity L, Swingler R. Cohort study of operative delivery in the second stage of labour and standard of obstetric care. *BJOG* 2003;110:610–5.
72. Royal College of Obstetricians and Gynaecologists. *Responsibilities of Consultant On-call*. Good Practice No. 8. London: RCOG; 2009.
73. Butler K, Ramphul M, Dunney C, Farren M, McSweeney A, McNamara K, et al. A prospective cohort study of the morbidity associated with operative vaginal deliveries performed by day and at night. *BMJ Open* 2014;4:e006291.
74. Salman L, Hadar E, Aviram A, Wiznitzer RC, Chen R, Gabbay-Benziv R. 913: When the sun goes down - effect of time of day on perinatal adverse outcome following vacuum assisted vaginal deliveries. *Am J Obstet Gynecol* 2017;216:S521.
75. Bardos J, Loudon H, Rekawek P, Friedman F, Brodman M, Fox NS. Associations Between Senior Obstetrician Supervision of Resident Deliveries and Mode of Delivery. *Obstet Gynecol* 2017;129:486–90.
76. Åberg K, Norman M, Pettersson K, Ekéus C. Vacuum extraction of fetal macrosomia and risk of neonatal complications: a population-based cohort study. *Acta Obstet Gynecol Scand* 2016;95:1089–96.
77. Ahlberg M, Norman M, Hjelmstedt A, Ekéus C. Risk factors for failed vacuum extraction and associated complications in term newborn infants: a population-based cohort study. *J Matern Fetal Neonatal Med* 2016;29:1646–51.
78. Aiken AR, Aiken CE, Alberry MS, Brockelsby JC, Scott JG. Management of fetal malposition in the second stage of labor: a propensity score analysis. *Am J Obstet Gynecol* 2015;212:355.
79. Lipschuetz M, Cohen SM, Ein-Mor E, Sapir H, Hochner-Celnikier D, Porat S, et al. A large head circumference is more strongly associated with unplanned cesarean or instrumental delivery and neonatal complications than high birthweight. *Am J Obstet Gynecol* 2015;213:833.
80. Ooi PV, Ramphul M, Said S, Burke G, Kennelly MM, Murphy DJ. Ultrasound assessment of fetal head circumference at the onset of labor as a predictor of operative delivery. *J Matern Fetal Neonatal Med* 2015;282:182–6.
81. Revah A, Ezra Y, Farine D, Ritchie K. Failed trial of vacuum or forceps – maternal and fetal outcome. *Am J Obstet Gynecol* 1997;176:200–4.
82. Alexander JM, Leveno KJ, Hauth JC, Landon MB, Gilbert S, Spong CY, et al. Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units Network (MFMU). Failed operative vaginal delivery. *Obstet Gynecol* 2009;114:1017–22.
83. Olagundoye V, MacKenzie IZ. The impact of a trial of instrumental delivery in theatre on neonatal outcome. *BJOG* 2007;114:603–8.
84. Johanson RB, Menon BK. Vacuum extraction versus forceps for assisted vaginal delivery. *Cochrane Database Syst Rev* 2000;2:CD000224.
85. Attilakos G, Sibanda T, Winter C, Johnson N, Draycott T. A randomised controlled trial of a new handheld vacuum extraction device. *BJOG* 2005;112:1510–5.
86. Groom KM, Jones BA, Miller N, Paterson-Brown S. A prospective randomised controlled trial of the Kiwi Omnicup versus conventional ventouse cups for vacuum-assisted vaginal delivery. *BJOG* 2006;113:183–9.
87. Equy V, David-Tchouda S, Dreyfus M, Riethmuller D, Vendittelli F, Cabaud V, et al. Clinical impact of the disposable ventouse iCup® versus a metallic vacuum cup: a multicenter randomized controlled trial. *BMC Pregnancy Childbirth* 2015;15:332.
88. Mola GD, Kuk JM. A randomised controlled trial of two instruments for vacuum-assisted delivery (Vacca Re-Usable

OmniCup and the Bird anterior and posterior cups) to compare failure rates, safety and use effectiveness. *Aust N Z J Obstet Gynaecol* 2010;50:246–52.
89. Baskett TF, Fanning CA, Young DC. A prospective observational study of 1000 vacuum assisted deliveries with the OmniCup device. *J Obstet Gynaecol Can* 2008;30:573–80.
90. Johanson R, Menon V. Soft versus rigid vacuum extractor cups for assisted vaginal delivery. *Cochrane Database of Syst Rev* 2000;2: CD000446.
91. O'Mahony F, Hofmeyr GJ. Menon V. Choice of instruments for assisted vaginal delivery. *Cochrane Database of Syst Rev* 2010;11: CD005455.
92. Department of Health, Welsh Office, Scottish Home and Health Department, Department of Health and Social Services, Northern Ireland. *Report on Confidential Enquiries into Maternal Deaths in the United Kingdom, 1988–1990*. London: HMSO; 1994.
93. Department of Health, Welsh Office, Scottish Home and Health Department, Department of Health and Social Services, Northern Ireland. Why Mothers Die. Report on Confidential Enquiries into Maternal Deaths in the United Kingdom, 1994–1996. London: The Stationery Office; 1998.
94. Macleod M, Strachan B, Bahl R, Howarth L, Goyder K, Van de Venne M, et al. A prospective cohort study of maternal and neonatal morbidity in relation to use of episiotomy at operative vaginal delivery. *BJOG* 2008;115:1688–94.
95. Memon HU, Blomquist JL, Dietz HP, Pierce CB, Weinstein MM, Handa VL. Comparison of levator ani muscle avulsion injury after forceps-assisted and vacuum-assisted vaginal childbirth. *Obstet Gynecol* 2015;125:1080–7.
96. Bradley MS, Kaminski RJ, Streitman DC, Dunn SL, Krans EE. Effect of rotation on perineal lacerations in forceps-assisted vaginal deliveries. *Obstet Gynecol* 2013;122:132–7.
97. Crane AK, Geller EJ, Bane H, Ju R, Myers E, Matthews CA. Evaluation of pelvic floor symptoms and sexual function in primiparous women who underwent operative vaginal delivery versus caesarean delivery for second-stage arrest. *Female Pelvic Med Reconstr Surg* 2013;19:13–6.
98. Wang J, Vause S, Tower C. Defining risks of instrumental delivery in a large UK cohort. *Arch Dis Child Fetal Neonatal Ed* 2012;97:A79.
99. Räisänen S, Vehviläinen-Julkunen K, Cartwright R, Gissler M, Heinonen S. Vacuum-assisted deliveries and the risk of obstetric anal sphincter injuries-a retrospective register-based study in Finland. *BJOG* 2012;119:1370–8.
100. De Souza A, Dwyer PL, Charity M, Thomas E, Ferreira CH, Schierlitz L. The effects of mode delivery on postpartum sexual function: a prospective study. *BJOG* 2015;122:1410–8.
101. Macleod M, Goyder K, Howarth L, Bahl R, Strachan B, Murphy DJ. Morbidity experienced by women before and after operative vaginal delivery: prospective cohort study nested within a two-centre randomised controlled trial of restrictive versus routine use of episiotomy. *BJOG* 2013;120:1020–7.
102. Johanson RB, Heycock E, Carter J, Sultan AH, Walklate K, Jones PW. Maternal and child health after assisted vaginal delivery: five-year follow up of a randomised controlled study comparing forceps and ventouse. *Br J Obstet Gynaecol* 1999;106:544–9.
103. Whitby EH, Griffiths PD, Rutter S, Smith MF, Sprigg A, Ohadike P, et al. Frequency and natural history of subdural haemorrhages in babies and relation to obstetric factors. *Lancet* 2004;363:846–51.
104. Schvartzman JA, Carroli D, Di Renzo GC, Hofmeyr J, Kafrissen M, Merialdi M, et al. 0607 The ODON device. A new simple instrument for assisted vaginal delivery. *Int J Gynecol Obstet* 2012;119:S475–6.
105. Al Wattar BH, Al Wattar B, Gallos I, Pirie AM. Rotational vaginal delivery with Kielland's forceps: a systematic review and meta-analysis of effectiveness and safety outcomes. *Curr Opin Obstet Gynecol* 2015;27:438–44.
106. Bahl R, Van de Venne M, Macleod M, Strachan B, Murphy DJ. Maternal and neonatal morbidity in relation to the instrument used for mid-cavity rotational operative vaginal delivery: a prospective cohort study. *BJOG* 2013;120:1526–32.
107. Stock SJ, Josephs K, Farquharson S, Love C, Cooper SE, Kissack C, et al. Maternal and neonatal outcomes of successful Kielland's rotational forceps delivery. *Obstet Gynecol* 2013;121:1032–9.
108. Burke N, Field K, Mujahid F, Morrison JJ. Use and safety of Kielland's forceps in current obstetric practice. *Obstet Gynecol* 2012;120:766–70.
109. Al-Suhel R, Gill S, Robson S, Shadbolt B. Kjelland's forceps in the new millennium. Maternal and neonatal outcomes of attempted rotational forceps delivery. *Aust N Z J Obstet Gynaecol* 2009;49:510–4.
110. O'Brien S, Day F, Lenguerrand E, Cornthwaite K, Edwards S, Siassakos D. Rotational forceps versus manual rotation and direct forceps: A retrospective cohort study. *Eur J Obstet Gynecol Reprod Biol* 2017;212:119–25.
111. Tempest N, Hart A, Walkinshaw S, Hapangama DK. A re-evaluation of the role of rotational forceps: retrospective comparison of maternal and perinatal outcomes following different methods of birth for malposition in the second stage of labour. *BJOG* 2013;120:1277–84.
112. Tempest N, McGuinness N, Lane S, Hapangama DK. Neonatal and maternal outcomes of successful manual rotation to correct malposition of the fetal head; A retrospective and prospective observational study. *PLoS ONE* 2017;12:e0176861.
113. Aiken CE, Aiken AR, Brockelsby JC, Scott JG. Factors influencing the likelihood of instrumental delivery success. *Obstet Gynecol* 2014;123:796–803.
114. Vacca A. The trouble with vacuum extraction. *Curr Obstet Gynaecol* 1999;9:41–5.
115. Ramphul M, Kennelly MM, Burke G, Murphy DJ. Risk factors and morbidity associated with suboptimal instrument placement at instrumental delivery: observational study nested within the Instrumental Delivery & Ultrasound randomised controlled trial ISRCTN 72230496. *BJOG* 2015;122:558–63.
116. Miller ES. 223: Is duration of operative vaginal delivery associated with adverse obstetric outcomes? *Am J Obstet Gynecol* 2016;214: S133.
117. Suwannachat B, Lumbiganon P, Laopaiboon M. Rapid versus stepwise negative pressure application for vacuum extraction assisted vaginal delivery. *Cochrane Database Syst Rev* 2012:CD006636.
118. Gardella C, Taylor M, Benedetti T, Hitti J, Critchlow C. The effect of sequential use of vacuum and forceps for assisted vaginal delivery on neonatal and maternal outcomes. *Am J Obstet Gynecol* 2001;185:896–902.
119. Mastrolia SA, Walfisch A, Wainstock T, Landau D, Sheiner E. 947: Failed vacuum does not increase the risk for long-term pediatric neurological morbidity. *Am J Obstet Gynecol* 2017;216: S535–6.
120. Murphy DJ, Macleod M, Bahl R, Strachan B. A cohort study of maternal and neonatal morbidity in relation to use of sequential instruments at operative vaginal delivery. *Eur J Obstet Gynecol Reprod Biol* 2011;156:41–5.

121. Fong A, Wu E, Pan D, Ogunyemi D, Chung J. 784: Failure rate and delivery-related maternal morbidity in vacuum delivery, forceps delivery, or a combination of both. *Am J Obstet Gynecol* 2013;208:S329.
122. NHS Litigation Authority. *Clinical Negligence Scheme for Trusts. Maternity. Clinical Risk Management Standards, April 2005*. London: NHSLA; 2005.
123. Jeve YB, Navti OB, Konje J. Comparison of techniques used to deliver a deeply impacted fetal head at full dilatation: a systematic review and meta-analysis. *BJOG* 2016;123:337–345.
124. Murphy DJ, Macleod M, Bahl R, Goyder K, Howarth L, Strachan B. A randomised controlled trial of routine versus restrictive use of episiotomy at operative vaginal delivery: a multicentre pilot study. *BJOG* 2008;115:1695–702.
125. de Leeuw JW, de Wit C, Kuijken JP, Bruinse HW. Mediolateral episiotomy reduces the risk for anal sphincter injury during operative vaginal delivery. *BJOG* 2008;115:104–8.
126. de Vogel J, van der Leeuw-van Beek A, Gietelink D, Vujkovic M, de Leeuw JW, van Bavel J, et al. The effect of mediolateral episiotomy during operative vaginal delivery on the risk of developing obstetrical anal sphincter injuries. *Am J Obstet Gynecol* 2012;206:404.
127. Gurol-Urangci I, Cromwell DA, Edozien LC, et al. Third and fourth degree perineal tears among primiparous women in England between 2000 and 2012: time trends and risk factors. *BJOG* 2013;120:1516–25.
128. Royal College of Obstetricians and Gynaecologists. *The Management of Third- and Fourth-Degree Perineal Tears*. Green-top Guideline No. 29. London: RCOG; 2015.
129. Lund NS, Persson LK, Jangö H, Gommesen D, Westergaard HB. Episiotomy in vacuum-assisted delivery affects the risk of obstetric anal sphincter injury: a systematic review and meta-analysis. *Eur J Obstet Gynecol Reprod Biol* 2016;207:193–9.
130. Sagi-Dain L, Sagi S. Morbidity associated with episiotomy in vacuum delivery: a systematic review and meta-analysis. *BJOG* 2015;122:1073–81.
131. Liabsuetrakul T, Choobun T, Peeyananjarassri K, Islam QM. Antibiotic prophylaxis for operative vaginal delivery. *Cochrane Database Syst Rev* 2017;8:CD004455.
132. Bonet M, Ota E, Chibueze CE, Oladapo OT. Routine antibiotic prophylaxis after normal vaginal birth for reducing maternal infectious morbidity. *Cochrane Database Syst Rev* 2017;11:CD012137.
133. Knight M, Chiocchia V, Partlett C, Rivero-Arias O, Hua X, Hinshaw K, et al. on behalf of the ANODE collaborative group*. Prophylactic antibiotics in the prevention of infection after operative vaginal delivery (ANODE): a multicentre randomised controlled trial. *Lancet* 2019;393:2395–403.
134. Royal College of Obstetricians and Gynaecologists. *Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium*. Green-top Guideline No. 37a. London: RCOG; 2015.
135. Nikpoor P, Bain E. Analgesia for forceps delivery. *Cochrane Database Syst Rev* 2013;9:CD008878.
136. Mulder F, Schoffelmeer M, Hakvoort R, Limpens J, Mol BW, van der Post JA, et al. Risk factors for postpartum urinary retention: a systematic review and meta-analysis. *BJOG* 2012;119:1440–6.
137. Zaki MM, Pandit M, Jackson S. National survey for intrapartum and postpartum bladder care: assessing the need for guidelines. *BJOG* 2004;111:874–6.
138. National Institute for Health and Care Excellence. *Postnatal care up to 8 weeks after birth*. NICE Clinical Guideline 37. London: NICE; 2006.
139. National Institute for Health and Care Excellence. (2013) *Urinary incontinence in women: management*. NICE Clinical Guideline 171. London: NICE; 2015.
140. Neron M, Allègre L, Huberlant S, Mousty E, de Tayrac R, Fatton B, et al. Impact of systematic urinary catheterization protocol in delivery room on covert postpartum urinary retention: a before-after study. *Sci Rep* 2017;7:17720.
141. Woodley SJ, Boyle R, Cody JD, Mørkved S. Hay-Smith EC. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. *Cochrane Database Syst Revs* 2017;12:CD007471.
142. Chiarelli P, Cockburn J. Promoting urinary continence in women after delivery: randomised controlled trial. *BMJ* 2002;324:1241.
143. Adams SS, Eberhard-Gran M, Sandvik ÄR, Eskild A. Mode of delivery and postpartum emotional distress: a cohort study of 55,814 women. *BJOG* 2012;119:298–305.
144. Rowlands IJ, Redshaw M. Mode of birth and women's psychological and physical wellbeing in the postnatal period. *BMC Pregnancy and Childbirth* 2012;12:138.
145. Andersen LB, Melvaer LB, Videbech P, Lamont RF, Joergensen JS. Risk factors for developing post-traumatic stress disorder following childbirth: a systematic review. *Acta Obstet Gynecol Scand* 2012;91:1261–72.
146. Garthus-Niegel S, von Soest T, Vollrath ME, Eberhard-Gran M. The impact of subjective birth experiences on post-traumatic stress symptoms: a longitudinal study. *Arch Womens Ment Health* 2013;16:1–10.
147. Bastos MH, Furuta M, Small R, McKenzie-McHarg K, Bick D. Debriefing interventions for the prevention of psychological trauma in women following childbirth. *Cochrane Database Syst Revs* 2015:CD007194.
148. Murphy DJ, Liebling RE. Cohort study of maternal views on future mode of delivery following operative delivery in the second stage of labor. *Am J Obstet Gynecol* 2003;188:542–8.
149. Care Quality Commission. *Regulation 20: Duty of Candour. Information for all providers: NHS bodies, adult social care, primary medical and dental care, and independent healthcare*. London: CQC; 2015.

Appendix 1 Explanation of guidelines and evidence levels

Clinical guidelines are: 'systematically developed statements which assist clinicians and patients in making decisions about appropriate treatment for specific conditions'. Each guideline is systematically developed using a standardised methodology. Exact details of this process can be found in Clinical Governance Advice No.1 *Development of RCOG Green-top Guidelines* (available on the RCOG website at https://www.rcog.org.uk/en/guidelines-research-services/guidelines/clinical-governance-advice-1a/). These recommendations are not intended to dictate an exclusive course of management or treatment. They must be evaluated with reference to individual patient needs, resources and limitations unique to the institution and variations in local populations. It is hoped that this process of local ownership will help to incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty where further research may be indicated.

The evidence used in this guideline was graded using the scheme below and the recommendations formulated in a similar fashion with a standardised grading scheme.

Classification of evidence levels

1++	High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias
1−	Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias
2++	High-quality systematic reviews of case–control or cohort studies or high-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
2+	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chanceand a moderate probability that the relationship is causal
2−	Case–control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal
3	Non-analytical studies, e.g. case reports, case series
4	Expert opinion

Grades of Recommendation

A	At least one meta-analysis, systematic reviews or RCT rated as 1++, and directly applicable to the target population; or a systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+ directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+

Good Practice Points

✓	Recommended best practice based on the clinical experience of the guideline development group

Appendix 2 Assisted vaginal birth record (revised)

ASSISTED VAGINAL BIRTH RECORD

Patient details: (addressograph)

Operator: Grade:
Supervisor: Grade:

Indication (s) for birth: .....

Classification of OVB: Outlet □ Low □ Mid-pelvic □ Rotation > 45^0 Yes □ No □

Classification of CTG: Normal □ Suspicious □ Pathological □ **Liquor**: Clear □ Meconium □ None seen □

Prerequisites:
Place of birth Labour Room □ Theatre □
Analgesia Local □ Pudendal □ Regional □
Consent Verbal □ Written □
Bladder emptied Yes □ No □

Examination
1/5ths per abdomen: 0 □ +1 □
Dilatation: Fully □
Position: OA□ LOA□ ROA□ OP□ LOP□ ROP□ LOT□ ROT□
Station: 0□ +1□ +2□ +3□
Caput: 0□ +□ ++□ +++□
Moulding: 0□ +□ ++□ +++□

Procedure
Instrument used (tick all)
Vacuum: Sialastic □ Kiwi □ Metal anterior □ Metal posterior □
Forceps: Rotational □ Non-rotational □ Outlet □

Number of pulls:

Traction: Gentle □ Moderate □ Strong □

Maternal effort: Sub-optimal □ Optimal □

Placenta: Physiological □ CCT □ Manual □

Episiotomy: Yes □ No □
Perineal tear: 1st degree □
2nd degree □
3rd / 4th degree □ *(complete proforma)*
Other □ *(complete proforma)*

Multiple instrument use Yes □ No □
Examination before second instrument
1/5ths per abdomen 0 □ +1 □
Position: OA□ LOA□ ROA□ OP□ LOP□ ROP□ LOT□ ROT□
Station: 0□ +1□ +2□ +3□
Caput: 0□ +□ ++□ +++□
Moulding: 0□ +□ ++□ +++□

Decision for second instrument:
.....
.....

Time of decision:
Time instrument applied:
Time second instrument applied:
Time of birth:

EBL.....

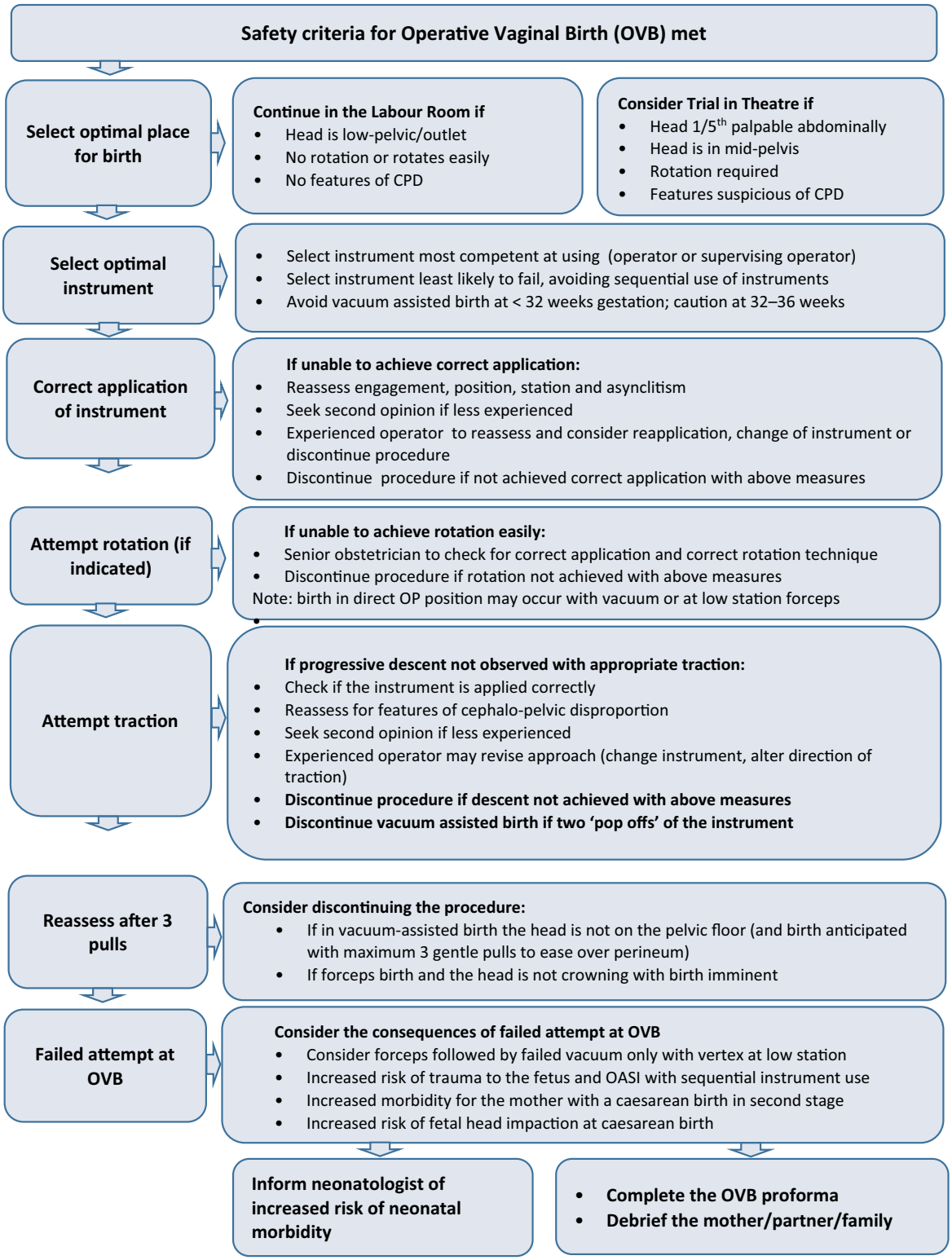
Baby: M □ F □ Birth weight..... (g) Apgar: 1....5.....10.... **Cord pH**: Arterial ..... Venous.....
Post-birth care: **Base excess:** Arterial ..... Venous.....
Level of Care Routine □ High Dependency □
Syntocinon infusion Y □ N □
Catheter Y □ N □ Remove.....
Vaginal Pack Y □ N □ Remove.....
Analgesia prescribed: Y □ N □ Diclofenac 100mg PR Y □ N □
Thromboembolic Risk: Low □ Medium □ High □ *(complete VTE assessment proforma)*
Thromboprophylaxis prescribed: Y □ N □

Additional details: (use additional operation note if needed)

Template to be adapted for local use

Signature:..... **Date:**.....

Appendix 3 Decision making for assisted vaginal birth



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The final version is the responsibility of the Guidelines Committee of the RCOG.

The guideline will be considered for update 3 years after publication, with an intermediate assessment of the need to update 2 years after publication.

DISCLAIMER

The Royal College of Obstetricians and Gynaecologists produces guidelines as an educational aid to good clinical practice. They present recognised methods and techniques of clinical practice, based on published evidence, for consideration by obstetricians and gynaecologists and other relevant health professionals. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor or other attendant in the light of clinical data presented by the patient and the diagnostic and treatment options available.

This means that RCOG Guidelines are unlike protocols or guidelines issued by employers, as they are not intended to be prescriptive directions defining a single course of management. Departure from the local prescriptive protocols or guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.

