



# each baby COUNTS.

Themed report on anaesthetic care,  
including lessons identified from  
Each Baby Counts babies born 2015 to 2017



July 2018

© 2017 The Royal College of Obstetricians and Gynaecologists

All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means, without the prior written permission of the publisher or, in the case of reprographic reproduction, in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK [[www.cla.co.uk](http://www.cla.co.uk)]. Enquiries concerning reproduction outside the terms stated here should be sent to the publisher at the UK address printed on this page.

Published by the Royal College of Obstetricians and Gynaecologists  
27 Sussex Place  
Regent's Park  
London NW1 4RG

Registered Charity No. 213280

Copy-editing and typesetting: Andrew Welsh ([www.andrew-welsh.com](http://www.andrew-welsh.com))  
Illustrations: Ian Friday ([www.bourneandbred.co.uk](http://www.bourneandbred.co.uk))

This report should be cited as:

Royal College of Obstetricians and Gynaecologists.

*Each Baby Counts: Themed report on anaesthetic care, including lessons identified from Each Baby Counts babies born 2015 to 2017.* London: RCOG; 2018

# Contents

<b>Acknowledgements</b>	<b>ii</b>
<b>Summary and key recommendations</b>	<b>1</b>
<b>Background</b>	<b>3</b>
<b>Methods</b>	<b>4</b>
<b>Results</b>	<b>5</b>
Characteristics of the mothers and babies included in this analysis	5
Themes and recommendations for care	5
1. Communication – ‘compound delay in delivery’, ‘cumulative delays’	6
2. Regional anaesthesia	9
3. Difficult intubation	10
4. Human factors	13
5. Anaphylaxis	15
6. Maternal tachycardia	15
<b>Conclusion</b>	<b>16</b>
<b>References</b>	<b>17</b>

# Acknowledgements

Writing Group: Marian Knight (Senior Project Advisor), Janet Barrie (Consultant Anaesthetist), Ross Clark (Consultant in Obstetric and General Anaesthesia) and Elizabeth Walker (Consultant Anaesthetist) on behalf of the Each Baby Counts Project Team.

The Each Baby Counts Project Team:

- Zarko Alfirevic; Co-Principal Investigator
- Alan Cameron; Co-Principal Investigator
- Becky Dumbrill; Administrator
- Margaret Keenan; Sands Midwifery Fellow
- Hannah Knight; Co-Investigator
- Marian Knight; Senior Project Advisor
- Edward Morris; Co-Investigator
- Emily Petch; Project Manager
- Sarah Prince; Clinical Fellow
- Edward Prosser-Snelling; Quality Improvement Lead
- Louise Robertson; Co-Investigator

The development of the Each Baby Counts programme was supported by a grant from the Department of Health and a generous legacy donation from Dr Lindsay Stewart OBE CA FRCOG(hon) FRCSEd FRCSI to the Royal College of Obstetricians and Gynaecologists (RCOG), for which we are very grateful. We are also thankful to the March of Dimes for sponsoring the Each Baby Counts launch event in October 2014 and the Clinical Engagement Forums in 2016 and 2017.


We are indebted to the many healthcare professionals and other organisations who were involved in the notification of Each Baby Counts babies and the provision of other information. Without the generous contribution of their time and expertise, it would not have been possible to produce this report. We would particularly like to thank all of the Each Baby Counts Lead Reporters and Reviewers whose contribution has made it possible to carry out this surveillance and analysis.

We would also like to express our gratitude to the members of our Independent Advisory Group for supervision, strategic direction and governance of the activities of the programme, to our Independent Data Surveillance Panel, which is responsible for careful scrutiny of the national surveillance and Serious Incident (SI) data submitted to Each Baby Counts, and to the MBRRACE-UK team for providing data to check case ascertainment.

Finally, we are grateful to members of the RCOG committees and other organisations who have provided useful thoughts and valuable feedback on draft versions of this report, particularly the Obstetric Anaesthetists' Association (OAA), the Royal College of Anaesthetists (RCoA) and the RCOG's Clinical Quality Assurance Committee.




# Summary and key recommendations

All reviews in which critical anaesthetic contributory factors had been identified by Each Baby Counts reviewers or which had been referred for review by an Each Baby Counts anaesthetic assessor were included in this analysis. This led to inclusion of 21 babies born in 2015, 20 babies born in 2016 and eight babies born in 2017 (note that not all hospitals have yet provided complete data for 2016 and 2017). This report is thus based on the reviews of the care of 49 babies. An internal anaesthetic reviewer was involved in the hospital review team for only 20 (41%) of the 49 babies who were felt to have critical anaesthetic contributory factors to their care.

<p>All reviews should involve an obstetric anaesthetist and should include review of the detailed anaesthetic record.</p>	
---	---

## Theme I: Communication

In most instances, anaesthetic delay occurred in the context of established concerns over fetal wellbeing, and may have led to exacerbation of compromise. However, no instances were identified where anaesthetic delays were the sole contributory factor. Nevertheless, it was clear on a number of occasions where anaesthetic delays occurred that the communication around the urgency of delivery needed to be improved.

<p>Anaesthetists should always be informed of the degree of urgency of delivery. As an aid to communication, the classification of urgency of caesarean section should be used for all operative deliveries, vaginal as well as abdominal.</p>	
<p>A decision about the purpose of transfer to theatre and urgency of any delivery should be made together with the anaesthetist before transfer to theatre. The degree of urgency should be reviewed on entering theatre prior to the WHO check, and the obstetrician should confirm the degree of urgency directly to the anaesthetist.</p>	
<p>Anaesthetists should use a structured and validated anaesthetic handover tool between shifts and, if possible, participate in the routine labour ward handover/review of the delivery suite board. This will help maintain situational awareness and enable early anticipation of anaesthetic difficulties.</p>	

## Theme 2: Regional anaesthesia

There were several instances when an epidural in labour had been only partially effective and yet attempts were made to top up this epidural when a decision was made for category I caesarean section delivery.

All women who receive epidural analgesia should be reviewed to ensure the effectiveness of the epidural and to minimise delays should the need for operative delivery arise. The functioning of an in-labour epidural should be taken into consideration when deciding on the most appropriate and timely means of anaesthesia for operative delivery.



## Theme 3: Difficult intubation

There were five instances of failed intubation, the majority in women who did not have clear risk factors. In all instances, the woman's safety was appropriately ensured, but this did result in delayed delivery.

The safety of the mother must be the primary concern at all times. Women should not be put at risk of airway problems through inadequate preparation/positioning due to haste to achieve rapid delivery. The required equipment for the management of difficult and failed tracheal intubation in obstetrics detailed in the OAA/DAS guidelines should always be available and all anaesthetists should undergo specific difficult airway training.



## Conclusions and implementation

Many of the lessons on situational awareness and the need for a 'helicopter view' identified in the Each Baby Counts 2015 full report<sup>1</sup> are echoed in this analysis. In addition, there is a clear need to optimise communication about the urgency of delivery to allow for informed choice of method of anaesthesia.

There is a need for the development of a structured communication tool to include the three-fold elements of the delivery plan: mode of delivery, location of birth and category of urgency. This will form a key Each Baby Counts implementation output from this report, and the RCOG is committed to collaborating with the relevant organisations to produce this at the earliest opportunity.



# Background

Each Baby Counts is the Royal College of Obstetricians and Gynaecologists' national quality improvement programme to reduce the number of babies who die or are left severely disabled as a result of incidents occurring during term labour. Since 2015, the programme has identified all term babies born in the UK who have either died or had a severe brain injury following a presumed intrapartum event. A baby with brain injury is defined as one who has grade III hypoxic ischaemic encephalopathy (HIE), has undergone active therapeutic cooling, or is comatose with decreased central tone and seizures of any kind. Anonymised copies of local investigation/serious incident reports are reviewed by Each Baby Counts obstetricians, neonatologists and midwives to identify themes for improving care, and escalated for additional review by anaesthetists as required.

In 2015 a total of 1136 eligible babies were reported: 727 local reviews were sufficient for assessment of care, and critical anaesthetic contributory factors to the outcomes of 21 babies (3%) were identified, similar to the 2.9% reported in 2000.<sup>2</sup> However, anaesthetists had been involved in only 11% of the local reviews of babies' care.<sup>1</sup> This low level of involvement of anaesthetists in local reviews led to the prioritisation of analysis of anaesthetic contributory factors for this Each Baby Counts topic-based report as it was felt likely that key anaesthetic messages for care may have been missed by review teams consisting solely of obstetric and/or midwifery staff.

# Methods

All reviews in which critical anaesthetic contributory factors had been identified by Each Baby Counts reviewers or which had been referred for review by an Each Baby Counts anaesthetic assessor were included in this analysis. This led to inclusion of 21 babies born in 2015, 20 babies born in 2016 and eight babies born in 2017 (note that not all hospitals have yet provided complete data for 2016 and 2017). This report is thus based on the reviews of the care of 49 babies. As has been previously described,<sup>1</sup> a thematic analysis was undertaken. All reports were read and re-read and a coding framework developed by the lead author (MK); the coding framework was subsequently reviewed and revised in discussion with the Each Baby Counts anaesthetic reviewers (JB, RC, EW). Verbatim quotes from local reviews are used throughout this report to support the recommendations that are intended to address the contributory factors identified.



# Results

## Characteristics of the mothers and babies included in this analysis

Descriptive data were complete for all analyses apart from for body mass index (BMI), for which information was available for 44 (90%) of the 49 women included in this review. Data were complete for all of the babies. Twenty (41%) of the 49 women had epidural or attempted epidural anaesthesia, in 11 of whom the epidural did not provide adequate pain relief. In total, 21 of the 49 women (43%) had spinal, combined spinal-epidural or attempted spinal anaesthesia; the spinal anaesthesia was difficult or considered inadequate in ten of these women. Thirty (61%) of the 49 women had general anaesthesia for delivery; among these women there were five with failed endotracheal intubation, the majority of whom did not have any recognised risk factors for a difficult airway.

The mothers of the babies whose care was reviewed here had a median BMI of 28.5 kg/m<sup>2</sup> (interquartile range 23–34 kg/m<sup>2</sup>); 30 of the 44 women with known BMI were overweight or obese (69%) and 17 were obese (39%). Thirty-eight of the 49 babies were born by caesarean section (78%), with seven of these babies being born after a failed trial of operative vaginal birth. A further eight babies (16%) were born with the assistance of forceps, and the remaining three (6%) had unassisted vaginal births. Thirty-seven (76%) of the babies had severe brain injury, six (12%) were stillborn and six (12%) died in the neonatal period.

An internal anaesthetic reviewer was involved in the hospital review team for only 20 (41%) of the 49 babies who were felt to have critical anaesthetic contributory factors to their care. Only one review team (2%) involved an external anaesthetic reviewer. Overall, external reviewers (mostly obstetric) were involved in five review teams (10%).

## Themes and recommendations for care

As would be anticipated from the figures above, it was notable that very few anaesthetists were involved in the reviews of the care of these babies, all of whom were thought to have had an anaesthetic issue as a critical contributory factor. In many instances, essential detail was missing from the reviews concerning anaesthetic management, and the Each Baby Counts assessors were unable to determine whether appropriate management had taken place. In several records, comment was also made that anaesthetic records were unavailable for review. Where an anaesthetist had been involved in the review panel, a clear and detailed account of events was given. Unless all reviews involve an anaesthetist, there is a danger that, where anaesthetic input was not recognised as being needed, anaesthetic issues will be missed.

### Recommendation 1

All reviews should involve an obstetric anaesthetist and should include review of the detailed anaesthetic record.

## 1. Communication – ‘compound delay in delivery’, ‘cumulative delays’

“Compound delay in delivery due to capacity, acuity and anaesthetic difficulties... The anaesthetist attempted to top up the epidural in the room and again in theatre but could not achieve adequate anaesthesia, and therefore converted to a spinal with full knowledge by the obstetric team... The anaesthetist kept in contact with the obstetric team in theatre regarding his actions and progress [but] the obstetric team did not verbalise concern around the timing of the anaesthetic... No time frame for delivery was declared.”

This is a clear example of failure of communication between obstetric and anaesthetic teams – the category of urgency should have been made clear in theatre. In most instances, anaesthetic delay occurred in the context of established concerns over fetal wellbeing and/or other delays, and may have led to exacerbation of compromise, but no instances were identified where anaesthetic delays were the sole contributory factor. However, it was clear on a number of occasions where anaesthetic delays occurred that the communication around the urgency of delivery needed to be improved. This was particularly evident in the context of anaesthesia for urgent operative vaginal delivery, where widely understood classifications of urgency (for example, the four categories<sup>3</sup> of classification of urgency of caesarean section) are not used. Thus anaesthetists were unaware of the urgency with which the obstetric team assessed the need for the operative vaginal delivery. Reports note a ‘*lack of shared understanding of the urgency*’.

Direct obstetrician-to-anaesthetist communication concerning the urgency of any delivery will ensure that the anaesthetist is making an informed decision about the appropriate method of anaesthesia and, in the context of anaesthetic difficulties, when to revert to an alternative. The obstetrician must directly communicate with the anaesthetist if she or he wants delivery expedited. When an anaesthetist is task-focused, he or she may not be aware of the time and there should be someone else with this responsibility. As the Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) report noted in 2000,<sup>2</sup> reluctance by obstetricians and midwives to interrupt anaesthetists, particularly if they are having difficulties, may contribute to delays.

### Recommendation 2

Anaesthetists should always be informed of the degree of urgency of delivery. As an aid to communication, the classification of urgency of caesarean section should be used for all operative deliveries, vaginal as well as abdominal.

One review noted that, at a trial of instrumental vaginal delivery in theatre, ‘*During delays in achieving anaesthesia, methods of how to advance the delivery should be considered by the obstetric team*’. National Institute for Health and Care Excellence (NICE) guidelines are clear that a pudendal block is an appropriate alternative in this situation for instrumental birth.<sup>4</sup> However, it is important to be aware that, when instrumental delivery is planned in the presence of

fetal compromise, a pudendal block will never be sufficient for caesarean section and is therefore unlikely to be appropriate for a trial of instrumental vaginal delivery in theatre.

### Recommendation 3

If there is concern about fetal compromise, offer either tested effective anaesthesia or, if time does not allow this, a pudendal block combined with local anaesthetic to the perineum during instrumental birth.<sup>4</sup>

It was noted on several occasions that the urgency of caesarean section was changed, with an initial call for a category 1 (delivery within 30 minutes) delivery, which was subsequently downgraded to category 2 and then upgraded again. It was evident from the reviews that this led to confusion among staff and altered the anaesthetic decision concerning the method of anaesthesia, which led to delay when the delivery was reassessed as category 1. This might have been avoided if the obstetrician had stayed with the woman and communicated directly with the anaesthetist. In some instances, continuous fetal heart-rate monitoring was not carried out while anaesthesia was established and thus no one was aware of a significant deterioration in the fetal condition that should have increased the urgency with which delivery was expedited.

“When this decision was made, I discussed the priority for caesarean section with the obstetric team and was told I had time to top up the epidural. My usual practice is to start with a 5 ml bolus of 2% lidocaine with adrenaline followed 5 minutes later by a further 10ml bolus. I recall that I had given a total of 15 ml of the epidural top-up mix and was asked if the epidural would be [ready] to proceed with the caesarean section within 1 minute. I stated that the epidural would need longer to work and so moved to a general anaesthetic immediately.”

The review group noted that the decision to top up the epidural, which was then abandoned when the category 1 caesarean section was re-called, caused some delay in preparing [the woman] for her caesarean section under general anaesthetic.

Obstetric staff need to be aware that the decision to downgrade the urgency of a caesarean section may have an impact on the chosen mode of anaesthesia, which may lead to delay if delivery subsequently needs to be expedited.

### Recommendation 4

A decision about the purpose of transfer to theatre and urgency of any delivery should be made together with the anaesthetist before transfer to theatre. The degree of urgency should be reviewed on entering theatre prior to the WHO check, and the obstetrician should confirm the degree of urgency directly to the anaesthetist.

It is worth noting that many hospitals now have a 'reduced' World Health Organization (WHO) checklist for category I caesarean sections, so this review of the degree of urgency will not add substantially to the in-theatre preparation time.

“The Consultant declared an emergency caesarean section... but there was no documented evidence of the grading within the medical records... Upon review, the panel identified that the caesarean section should have been classified as a Grade [category] 2... The woman was prepared for theatre and was seen by the anaesthetic specialist trainee (ST6) [18 minutes after the initial decision to deliver]. [38 minutes after the decision for caesarean section was made] a Grade I LSCS [lower segment caesarean section] was called for a second woman; this delayed the first woman going to theatre. At [43 minutes post-decision], the fetal heart was auscultated by the midwife and was recorded at 30–50 beats per minute (bpm). The obstetric consultant was called and immediately classified a Grade I LSCS at [48 minutes after the initial decision]. The woman was in theatre [54 minutes after the original decision]. The midwife was unable to auscultate (listen to) the fetal heart in theatre. Scan was performed by the consultant obstetrician and an intrauterine death [...] was confirmed. The obstetrician proceeded to LSCS under general anaesthetic and female stillbirth was delivered [80 minutes after the initial decision to deliver].”

There were multiple occasions when the anaesthetist was busy elsewhere in the labour ward and the need for a category I delivery was not adequately communicated to allow them to reprioritise the order in which they attended, and this led to delays. In other instances, plans were made for a category I delivery, but the deadline for delivery was allowed to slip because of other emergencies, either within the labour ward or in other departments.

“The ODP [operating department practitioner] was busy in the emergency department. When contacted, she asked about the urgency of the case, and although the term Grade I caesarean section was used, there was no urgency attached to the discussion and she did not leave the department immediately. The on-call ODP was phoned [in] from home. The emergency in [the emergency department] was dealt with before attending [labour ward].”

There should be an ODP immediately available (within 5 minutes) at all times in consultant-led units. There should be contingency plan in place if a second ODP is required in maternity. All staff working in maternity must understand the implications of the categories of urgency. Multiple emergencies are not uncommon on busy delivery units, and this should be anticipated when staff are additionally covering other areas of the hospital. If they need to come from home, early escalation is a priority.

### Recommendation 5

Contingency plans need to be made ahead of time for calling in additional staff and/or undertaking prioritisation decisions in the event of multiple simultaneous emergencies.

Antenatal referral to an anaesthetist is the best way of flagging up potential anaesthetic problems, which can then be identified by a sticker (for example) in the records.<sup>5</sup> However, on several occasions, delays resulted from unsuccessful regional or difficult general anaesthesia in women who had identifiable risk factors for problems with anaesthesia. The anaesthetists did not appear to be aware either that these women with risk factors were in labour or that they had labour complications which might necessitate an expedited delivery. In some instances, an anaesthetist on a previous shift had been aware but the information did not appear to have been passed on after a change of shift. In other instances, the risk factors were not recognised by the obstetric or midwifery teams. Use of a structured and validated anaesthetic handover tool between shifts<sup>5,6</sup> and anaesthetic participation on the ward round at the beginning of each shift would mitigate both of these situations, enabling early identification of potential airway difficulties, anticipation of the need for or potential problems with regional analgesia, and helping ensure appropriate communication. If these are not possible then the anaesthetist should receive a handover from the obstetrician or coordinating midwife. If this is a 'board' handover then the anaesthetist should familiarise themselves with women whose labours are complicated.

### Recommendation 6

Anaesthetists should use a structured and validated anaesthetic handover tool between shifts and, if possible, participate in the routine labour ward handover/review of the delivery suite board. This will help maintain situational awareness and enable early anticipation of anaesthetic difficulties.<sup>5</sup>

## 2. Regional anaesthesia

There were several instances when an epidural in labour had been only partially effective and yet attempts were made to top up this epidural when a decision was made for category I caesarean section delivery. This led to delays in obtaining effective analgesia when delivery was considered urgent.

“It is difficult to comment on the decision to proceed with operative delivery under epidural anaesthesia as this can only be made by the individual at the time. However, this particular labour epidural required multiple top-ups despite the use of an infusion. The need for multiple top-ups in this situation has been shown to be an independent risk factor for failure to extend labour analgesia to anaesthesia for caesarean section.”

As noted in this review, it is unlikely that an epidural that has already been at best partially effective during labour will be able to provide an adequate block for caesarean section.

### Recommendation 7

All women who receive epidural analgesia should be reviewed to ensure the effectiveness of the epidural and to minimise delays should the need for operative delivery arise. The functioning of an in-labour epidural should be taken into consideration when deciding on the most appropriate and timely means of anaesthesia for operative delivery.

In two instances, inadvertent dural punctures led to delay in anaesthesia for subsequent caesarean section.

“Inadvertent dural tap occurred with the first attempt at epidural placement, with cerebrospinal fluid on aspiration through the epidural catheter. According to the anaesthetic notes, it is documented that there were two attempts at epidural placement at two separate interspaces (L4/5, L3/4), the second of which was a combined spinal-epidural. The midwifery notes describe three attempts, the third of which was successful... The anaesthetist decided to top up the epidural for the caesarean delivery... However, there were several problems... the patient was known to have a known dural tap and was therefore at risk of unexpectedly high block on epidural top-up if intrathecal spread occurred.”

Inadvertent dural tap will occur with an incidence of approximately one in 100–200 epidural attempts<sup>7</sup> and it is reassuring that it was identified as a significant contributing factor in only two Each Baby Counts babies over a period of 3 years (more than two million births). However, it remains important to be aware of the possibility of a higher block with epidural top-up in the event of dural puncture. In circumstances such as this, if the anaesthetist anticipates difficulties/delays in establishing anaesthesia they should communicate this to the obstetrician so that an appropriate anaesthetic can be administered, taking into account maternal and fetal factors for that time frame.

### 3. Difficult intubation

There were five instances of failed intubation, the majority in women who did not have clear risk factors. Even in an emergency, there must be optimal preparation and positioning of the woman to minimise the risk; hypoxia during failed/difficult intubation is more likely to damage the fetus than the additional few seconds of preparation. Should failed tracheal intubation occur, avoiding maternal hypoxia is crucial as low maternal oxygen saturations are a predictor of neonatal intensive care unit (NICU) admission.<sup>8</sup> In all instances, the woman's safety was appropriately ensured, but this did result in delayed delivery. In some instances, there was evidence that the Obstetric Anaesthetists' Association (OAA) and Difficult Airway Society (DAS) guidelines<sup>9</sup> were not followed. Three unsuccessful attempts

at intubation were made by an anaesthetic trainee who subsequently, appropriately, used a laryngeal mask:

“When the events were discussed over the telephone with the anaesthetic consultant, they were informed that attempts at intubation had failed and the airway was being maintained with a laryngeal mask and advice was sought regarding the ability to undertake the caesarean section using the laryngeal mask as an airway. The consultant advised that a cord prolapse was not an indication to proceed and ideally the patient should be woken up.”

The OAA/DAS guidelines<sup>9</sup> include a table (Table I; see overleaf) of criteria to consider, both prior to and following induction of anaesthesia, as to whether to proceed with surgery or wake up the woman, which includes consideration of both maternal and fetal condition. This is a decision for the anaesthetist looking after the woman. As noted above, the primacy of maternal safety must be emphasised, and this may well require the anaesthetist, especially when junior and stressed by this life-threatening situation, to consult with a more experienced colleague. Note that correct use of Table I in the OAA/DAS guidelines will require input from the obstetrician. The whole team should therefore discuss what actions should be taken in the event of a failed intubation. The OAA/DAS guidelines should be displayed/available in all operating theatres to facilitate these discussions.

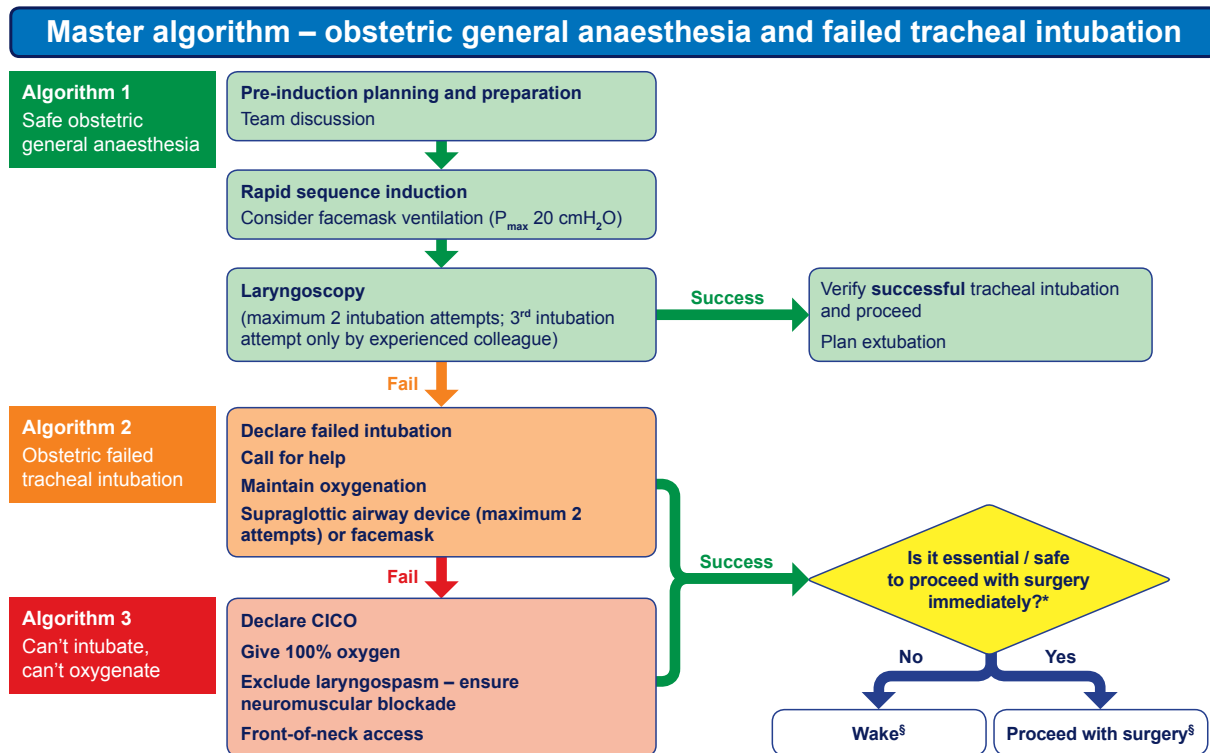
### Recommendation 8

The safety of the mother must be the primary concern at all times. Women should not be put at risk of airway problems through inadequate preparation/positioning due to haste to achieve rapid delivery. The required equipment for the management of difficult and failed tracheal intubation in obstetrics detailed in the OAA/DAS guidelines<sup>9</sup> should always be available and all anaesthetists should undergo specific difficult airway training.

The impact of a difficult intubation was minimised when the anaesthetist remained aware of the situation and followed standard practice:

“There was a very short delay commencing the LSCS due to a difficult intubation; according to the anaesthetist, a rapid sequence induction was commenced; the patient was pre-oxygenated, medication given and the application of cricoid pressure was commenced by the Operating Department Practitioner (ODP). The laryngoscopy was attempted with a standard laryngoscope and bougie insertion, but failed. The anaesthetist noted that the cricoid pressure was making the laryngoscopy and bougie insertion difficult and therefore the ODP was asked to remove the cricoid pressure and the intubation was successful.”

Failed intubation is recognised to be uncommon<sup>10</sup> and to fully prepare for this eventuality requires training and/or simulation.



\*See Table 1, §See Table 2

© Obstetric Anaesthetists' Association / Difficult Airway Society (2015)



### Table 1 – proceed with surgery?

Factors to consider		WAKE	↔	PROCEED
Before induction	<b>Maternal condition</b>	• No compromise	• Mild acute compromise	• Haemorrhage responsive to resuscitation
	<b>Fetal condition</b>	• No compromise	• Compromise corrected with intrauterine resuscitation, pH < 7.2 but > 7.15	• Continuing fetal heart rate abnormality despite intrauterine resuscitation, pH < 7.15
	<b>Anaesthetist</b>	• Novice	• Junior trainee	• Senior trainee
	<b>Obesity</b>	• Supermorbid	• Morbid	• Obese
	<b>Surgical factors</b>	• Complex surgery or major haemorrhage anticipated	• Multiple uterine scars • Some surgical difficulties expected	• Single uterine scar
	<b>Aspiration risk</b>	• Recent food	• No recent food • In labour • Opioids given • Antacids not given	• No recent food • In labour • Opioids not given • Antacids given
	<b>Alternative anaesthesia</b> • regional • securing airway awake	• No anticipated difficulty	• Predicted difficulty	• Relatively contraindicated
After failed intubation	<b>Airway device / ventilation</b>	• Difficult facemask ventilation • Front-of-neck	• Adequate facemask ventilation	• First generation supraglottic airway device
	<b>Airway hazards</b>	• Laryngeal oedema • Stridor	• Bleeding • Trauma	• Secretions • None evident



Criteria to be used in the decision to wake or proceed following failed tracheal intubation. In any individual patient, some factors may suggest waking and others proceeding. The final decision will depend on the anaesthetist's clinical judgement.

© Obstetric Anaesthetists' Association / Difficult Airway Society (2015)



Reproduced from Mushambi MC, Kinsella SM, Popat M, Swales H, Ramaswamy KK, Winton AL, Quinn AC. Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics. *Anaesthesia* 2015;70:1286–1306, with permission from Obstetric Anaesthetists' Association/Difficult Airway Society



### Recommendation 9

Skills and drills training: anaesthetists should help organise and participate in regular multidisciplinary drills covering delivery suite emergencies such as major obstetric haemorrhage, maternal collapse and failed intubation. These drills should be followed by debriefing and feedback so that lessons can be learned at both an individual and a systems level.<sup>11</sup>

The OAA/DAS guidelines<sup>9</sup> note the importance of follow-up after a difficult intubation and of providing women with written information documenting the problem. There was only one instance when it was clear that the woman had been given the appropriate information/ advice after a difficult intubation:

“The woman was reviewed by a senior anaesthetic trainee (Anaesthetist 4) on Day 8 and a difficult airway letter was given to her. As the woman’s husband was not present at this visit, arrangements were made for further anaesthetic follow-up the next day. The woman and her husband were seen by another consultant obstetric anaesthetist (Anaesthetist 5) on Day 9. Anaesthetist 5 offered condolences and explained the anaesthetic management of the case. The difficulties with correct positioning of the tracheal tube were discussed. In addition, it was stressed that if anaesthesia were required in the future, the anaesthetist must be informed that intubation had been previously difficult.”

### Recommendation 10

Where management of a woman’s airway has been difficult, she should always be provided with a letter giving details for her and her GP. A pro forma is available from the Difficult Airway Society.<sup>12</sup> Follow-up should take place in a postnatal anaesthetic clinic for debriefing.

## 4. Human factors

There was evidence of lack of situational awareness and/or fixation errors in the care of most babies, as well as among some of the local review teams. In some instances, there was a collective failure to identify simple solutions to problems. For example, a woman collapsed and the oxygen tubing from the piped supply was too short to reach where she fell. The team tried to find an oxygen cylinder rather than moving the woman closer to the supply, which led to an 8 minute delay in administering oxygen; this solution was not identified or discussed in the review.

On other occasions, symptoms were attributed to the anaesthetic and/or poor functioning of the anaesthetic when there was clear evidence of other problems.

### **‘Epidural fever’ – sepsis**

The anaesthetic reviewer in one hospital team noted the following in the local review:

“Epidural fever recognised but does shivering and very high temp for over an hour indicate epidural fever or maternal sepsis/chorioamnionitis?”

This woman had clear signs of sepsis with a temperature persistently over 39 °C and with both maternal and fetal tachycardia. Her temperature was attributed by staff as being due to the epidural, blood cultures were not taken and antibiotics were not prescribed. Concerns over the fetal heart rate led eventually to an urgent delivery. The baby was admitted to NICU with moderate–severe neonatal encephalopathy and group B Streptococcal sepsis.

Many women experience a moderate rise in temperature after an epidural is inserted. However, any rise in maternal temperature should trigger a review of her other physiological observations. The UK Sepsis Trust maternal inpatient sepsis tool<sup>13</sup> can be used to assess presence and severity of sepsis.

### **‘Breakthrough pain’ – uterine rupture**

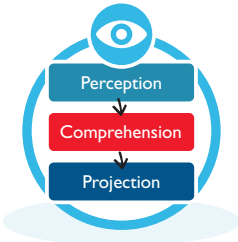

“The mother was tachycardic 110 and feeling breakthrough pain between contractions. Syntocinon was commenced as there was no change from earlier vaginal examinations and she was still 5 cm dilated.”

This woman, undergoing a trial of labour after previous caesarean section, had breakthrough pain that was treated with repeated epidural top-ups. No alternative cause for her pain was considered over the subsequent 3 hours when there were also repeated concerns about the cardiotocography (CTG). Her collapse led to a category I caesarean section at which her uterine rupture was diagnosed.

## **Recommendation II**

Breakthrough pain with a previously working epidural in a woman with a history of uterine surgery should trigger an obstetric review for scar rupture.

‘Human factors’ will be examined further in the next Each Baby Counts report in autumn 2018, but recommendations from the previous report deserve reiteration here.

<p>All members of the clinical team working on the delivery suite need to understand the key principles (perception, comprehension, projection) of maintaining situational awareness to ensure the safe management of complex clinical situations.</p>	
<p>A senior member of staff must maintain oversight of the activity on the delivery suite, especially when others are engaged in complex technical tasks. Ensuring someone takes this 'helicopter view' will prevent important details or new information from being overlooked and allow problems to be anticipated earlier.</p>	

## 5. Anaphylaxis

There were two occasions when urgent delivery was needed following maternal anaphylaxis to penicillin received in labour. Management was appropriate in both instances but both mothers required emergency delivery under general anaesthetic. Neither had known allergies. Anaphylaxis is unpredictable and should be included in skills and drills training in the management of maternal collapse. The Royal College of Anaesthetists' sixth National Audit Project report into perioperative anaphylaxis noted that obstetric units should ensure immediate availability of anaesthetic anaphylaxis treatment and investigation packs wherever general or regional anaesthesia is administered.<sup>13</sup>

## 6. Maternal tachycardia

When a mother is tachycardic, it can be difficult to differentiate the maternal pulse from the fetal heart rate, which may lead to evidence of fetal compromise, for example a bradycardia, being missed. On several occasions, it was noted that the anaesthetist pointed out when the CTG was recording a maternal tachycardia instead of the fetal heart rate. However, on another occasion, the anaesthetist was aware of a maternal tachycardia but this was not communicated to the obstetric staff who remained unaware that the CTG was inadvertently recording the maternal pulse.

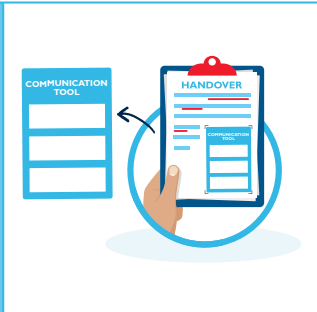
### Recommendation 12

In the event of a maternal tachycardia the anaesthetist and/or ODP should ensure that the duty obstetrician and midwife caring for the woman are informed.

# Conclusion

Although there were no babies for whom anaesthetic issues were thought to be the sole contributory factor to their outcome, most of the anaesthetic problems noted in these reviews contributed additionally to delays in delivery. Many of the lessons on situational awareness and the need for a ‘helicopter view’ identified in the Each Baby Counts 2015 full report<sup>1</sup> are echoed here. In addition, there is a clear need to optimise communication about the urgency of delivery to allow for informed choice of method of anaesthesia. The CESDI report in 2000<sup>2</sup> started with the statement ‘*the safety of modern obstetric care is based on teamwork... the anaesthetist is a key member of the perinatal management team*’, and this is still a clear message today.

There is a need for the development of a structured communication tool to include the three-fold elements of the delivery plan: mode of delivery, location of birth and category of urgency. This will form a key Each Baby Counts implementation output from this report, and the RCOG is committed to collaborating with the relevant organisations to produce this at the earliest opportunity.



# References

1. Royal College of Obstetricians and Gynaecologists. *Each Baby Counts: 2015 Full Report*. London: RCOG; 2017 [[www.rcog.org.uk/en/guidelines-research-services/audit-quality-improvement/each-baby-counts/ebc-2015-report/](http://www.rcog.org.uk/en/guidelines-research-services/audit-quality-improvement/each-baby-counts/ebc-2015-report/)].
2. Maternal and Child Health Research Consortium. *Confidential Enquiry into Stillbirths and Deaths in Infancy: 7th Annual Report, 1 January–31 December 1998*. London: Maternal and Child Health Research Consortium; 2000.
3. Royal College of Obstetricians and Gynaecologists & Royal College of Anaesthetists. *Classification of Urgency of Caesarean Section – A Continuum of Risk*. London: RCOG; 2010 [[www.rcog.org.uk/globalassets/documents/guidelines/goodpractice11classificationofurgency.pdf](http://www.rcog.org.uk/globalassets/documents/guidelines/goodpractice11classificationofurgency.pdf)].
4. National Institute for Health and Care Excellence. *Intrapartum Care for Healthy Women and Babies*. NICE Clinical Guideline 190. London: NICE; 2014 (update 2017) [[www.nice.org.uk/guidance/cg190](http://www.nice.org.uk/guidance/cg190)].
5. Bogod D, Laat F, Mushambi M, Lucas N, Kimber-Craig S. Chapter 9: Guidelines for the Provision of Anaesthesia Services for an Obstetric Population 2018. In *Guidelines for the Provision of Anaesthesia Services (GPAS)*. London: Royal College of Anaesthetists; 2018 [[www.rcoa.ac.uk/document-store/guidelines-the-provision-of-anaesthesia-services-obstetric-population-2018](http://www.rcoa.ac.uk/document-store/guidelines-the-provision-of-anaesthesia-services-obstetric-population-2018)].
6. Dharmadasa A, Bailes I, Gough K, Ebrahimi N, Robinson PN, Lucas DN. An audit of the efficacy of a structured handover tool in obstetric anaesthesia. *Int J Obstet Anesth* 2014;23(2):151–6.
7. Obstetric Anaesthetists' Association. *Headache after an epidural or spinal injection? What you need to know*. London: OAA; 2016 [[www.labourpains.com/assets/\\_managed/cms/files/Headache\\_after\\_epidural.pdf](http://www.labourpains.com/assets/_managed/cms/files/Headache_after_epidural.pdf)].
8. Quinn AC, Kinsella SM, Gorton HJ, Knight M, Columb MO, Robson SC, et al. Neonatal outcomes after failed tracheal intubation during obstetric general anaesthesia for caesarean section: secondary analysis of a UKOSS case–control study. *Eur J Obstet Gynecol Reprod Biol* 2017;217:181–2.
9. Mushambi MC, Kinsella SM, Popat M, Swales H, Ramaswamy KK, Winton AL, et al; Obstetric Anaesthetists' Association; Difficult Airway Society. Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics. *Anaesthesia* 2015;70(11):1286–306 [[www.ncbi.nlm.nih.gov/pmc/articles/PMC4606761/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4606761/)].
10. Quinn AC, Milne D, Columb M, Gorton H, Knight M. Failed tracheal intubation in obstetric anaesthesia: 2 yr national case-control study in the UK. *Br J Anaesth* 2013;110(1):74–80.
11. Association of Anaesthetists of Great Britain & Ireland and Obstetric Anaesthetists' Association. *OAA / AAGBI Guidelines for Obstetric Anaesthetic Services 2013*. London:

- AAGBI and OAA; 2013 [[www.aagbi.org/sites/default/files/obstetric\\_anaesthetic\\_services\\_2013.pdf](http://www.aagbi.org/sites/default/files/obstetric_anaesthetic_services_2013.pdf)].
12. Difficult Airway Society. *Airway Alert Form* [[www.das.uk.com/files/airwayalert.doc](http://www.das.uk.com/files/airwayalert.doc)].
  13. The UK Sepsis Trust. *Inpatient Maternal Sepsis Tool* [<https://sepsistrust.org/wp-content/uploads/2018/06/Inpatient-maternal-NICE-Final-1107-2.pdf>].
  14. Royal College of Anaesthetists. *Anaesthesia, Surgery and Life-Threatening Allergic Reactions: Report and findings of the Royal College of Anaesthetists' 6th National Audit Project*. London: Royal College of Anaesthetists; 2018 [[www.nationalauditprojects.org.uk/NAP6Report#pt](http://www.nationalauditprojects.org.uk/NAP6Report#pt)].



## Each Baby Counts

Royal College of Obstetricians and Gynaecologists  
27 Sussex Place, Regent's Park, London NW1 4RG

Phone: +44 (0)20 7772 6237

Email: [eachbabycounts@rcog.org.uk](mailto:eachbabycounts@rcog.org.uk)

Website: [rcog.org.uk/eachbabycounts](http://rcog.org.uk/eachbabycounts)

Twitter: [twitter.com/eachbabycounts](https://twitter.com/eachbabycounts)

