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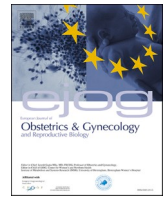
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## Full length article

## Managing an impacted fetal head at caesarean section: a UK survey of healthcare professionals and parents

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## ABSTRACT

**Objective(s):** To understand current practice, expertise and training requirements for management of an impacted fetal head (IFH) at caesarean section (CS) in the UK, and whether a clinical trial of techniques to manage an IFH is acceptable.

**Study design:** Five hundred and thirty-eight online surveys were completed by obstetricians ( $n = 206$ ), obstetric anaesthetists ( $n = 38$ ), midwives ( $n = 35$ ) and parents ( $n = 259$ ). Data was collected on incidences of CS and IFH, current use of techniques, and acceptability of a clinical trial to manage an IFH from health care professionals. Information on incidences of CS and recollection of an IFH, acceptability of techniques, and likelihood of taking part in a clinical trial were sought from parents.

**Results:** The most common technique used by obstetricians (84%) and midwives (69%) was the 'push technique'. Eighty-seven percent of health care professionals would be willing to participate in a clinical trial, with 89% confirming that results would guide their clinical practice. Most parents expressed reluctance regarding participation in a clinical trial during labour (62%), due to preferring a doctor to adopt the technique they felt most comfortable with (63%).

**Conclusion(s):** Given the lack of national guidance on appropriate techniques, no formal training, and no consensus on best practice for the management of an IFH during emergency CS, it is perhaps not surprising that the majority of health care professionals would be willing to participate in a clinical trial, where results will guide their clinical practice. The future development of clinical trials, involving relevant stakeholders in the design of such trials, is crucial to improve upon the guidance and training provided to staff who may encounter an IFH.

## Introduction

Caesarean sections (CS) account for 27% of all UK births [1] and 5% of CS (4900 births per year) are completed at full dilatation [2,3]. Emergency CS have risen in the UK from 5% of all deliveries in 1980 to 18% in 2015 [1], consistent with an increase in second stage CS [4]. Second stage CS births have an increased risk of maternal and neonatal morbidity compared to first stage CS [5]. Adverse outcomes include

haemorrhage, bladder trauma, injury to the baby and prolonged hospital stay [5]. Consequently, the Royal College of Obstetricians and Gynaecologists recommend that a consultant obstetrician be present for all second-stage CS.

Over the last 30 years the increased rates of CS are coupled with static levels of instrumental deliveries, an increase in the rate of ventouse deliveries and a reduction in the rate of forceps deliveries [4]. Junior obstetric trainees are often unsupervised when deciding on and

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performing second stage CS, and often opt for a CS due to concerns relating to associated maternal and neonatal morbidity from instrumental delivery [6]. Input from more experienced obstetricians in the second stage has shown to increase decisions in favour of vaginal birth, consequently avoiding the risks associated with CS at full dilation.

Second stage CS may be complicated when the fetal head is deeply impacted in the maternal pelvis, known as “impacted fetal head” (IFH), estimated to occur in 1.5% of all emergency CS [7]. Numerous techniques exist to assist in the delivery of an IFH with the aim of mitigating the associated risks of maternal and neonatal complications, these include “push” and “pull” methods [8], the Patwardhan method [9] and the insertion of a fetal pillow [10]. However, there is scarce evidence regarding the most effective techniques [11]. Currently there are no national guidelines on what techniques to employ, no formal training for obstetricians, obstetric anaesthetists, and midwives on management of an IFH, and no consensus on best practice.

This study aims to (i) understand current practice, level of expertise and training requirements for managing an IFH during emergency sections amongst consultant obstetricians, senior trainee obstetricians, obstetric anaesthetists, and midwives, and (ii) understand parents’ opinions of various techniques and their willingness to participate in a clinical trial in this area. The findings will be used to inform the design of a randomised controlled trial (RCT) comparing different techniques for managing an IFH during emergency CS.

The study is reported in accordance with the Checklist for Reporting Results of Internet E-surveys (CHERRIES; (Appendix A)) [12].

## Material and methods

Four online surveys (obstetricians, obstetric anaesthetists, midwives, parents) were designed using JISC online surveys© and user-tested by members of the multi-disciplinary research team prior to distribution (Appendix B). The team’s parent and public involvement representative inputted into the design of the parents’ survey. Most questions were created as an “optional response” with response rates to each question calculated as a percentage of the total number of submitted surveys. To reduce burden to participants, unnecessary questions were eliminated through adaptive questioning and skip logic techniques. The time taken to complete the pilot test surveys was recorded and questions were modified to ensure that all surveys could be completed in a reasonable length of time (approximately 10 min). To reduce the number and complexity of some questions, follow-up questions appeared dependent on the answer(s) provided previously. Participants were not required to provide an answer to all questions to proceed with the survey, though did have to complete the survey in one sitting and were unable to return to complete at a later time. Regarding techniques to manage an IFH, midwives and obstetric anaesthetists were only asked to comment on techniques that they would be involved with. All participants were asked to provide an email address if they wished to be contacted about future research but were reminded that answers to the survey would remain anonymous. Informed consent was assumed by completion of the survey.

The survey was a voluntary, open survey, and the study population was a convenience sample from individuals who could be reached through emails sent to members of relevant professional bodies and through social media. Anonymous survey links were distributed via several networks: British Intrapartum Care Society (BICS) and UK Audit and Research Collaborative in Obstetrics and Gynaecology (UKARCOG) (consultant and trainee obstetricians); Obstetric Anaesthetists Association (OAA); (obstetric anaesthetists); Royal College of Midwives (midwives); and National Childbirth Trust (NCT) (parents). All surveys were publicised via social media and personal contacts of study co-applicants were also utilised (for obstetric anaesthetists only). Surveys were initially distributed in July 2019, with at least two reminders sent and initially open for 8 weeks. As a result of an initial poor response rate, the midwives’ survey was subsequently re-opened in September 2019 and

reminders sent.

Data was stored within JISC online surveys with access only given to individuals within the research team. Once anonymous survey data was downloaded for analysis, it was stored on a secure server and accessible only to the research team.

## Analysis

The study was funded by the National Institute for Health Research Health Technology Assessment programme (NIHR HTA 17/75/09). The study was sponsored by the University of Nottingham and ethically approved by the Research Ethics Committee and Health Research Authority (19/WM/0118). The sponsor was not involved in the study design; the collection, analysis and interpretation of data; the writing of the report; or the decision to submit the article for publication.

JISC online surveys© only collects and analyses full responses and no completion checks were built-in; therefore partially completed surveys were automatically removed from the final analysis. Prior to analysis, all data were de-identified by removing any email addresses provided for contact regarding future studies.

Descriptive statistics of survey data were generated using Stata (version 16). Data was presented as n (% of total responses) and where appropriate, mean  $\pm$  1SD, median (interquartile range (IQR)) and minimum and maximum data was reported. No statistical correction methods were used.

## Results

A total of 538 individuals (206 obstetricians, 38 obstetric anaesthetists, 45 midwives and 259 parents) completed their respective surveys. Ten of the responses to the midwives’ survey did not practice as midwives, so were removed from the final analysis. During the 8-week recruitment period, participation was closely aligned with release of social media posts/emails. A smaller response rate was observed during the periods between the scheduled release of social media posts, e-mails, and follow-up advertisements.

### Obstetricians, midwives & obstetric anaesthetists

Recall of previous incidences of IFH are reported in Table 1. The majority of healthcare professionals had encountered an IFH at

**Table 1**  
Previous incidences of impacted fetal head in obstetricians, midwives and obstetric anaesthetists.

|                                            | Obstetricians (n = 206) | Midwives (n = 35) | Obstetric Anaesthetists (n = 38) |
|--------------------------------------------|-------------------------|-------------------|----------------------------------|
| No. of c-sections in past 3 months         |                         |                   |                                  |
| 0                                          | –                       | 13 (37)           | 0 (0)                            |
| 1–5                                        | –                       | 14 (40)           | 2 (5.3)                          |
| 5–10                                       | –                       | 8 (23)            | 1 (2.9)                          |
| >10                                        | –                       | 0 (0)             | 35 (92)                          |
| Recall of incidents of impacted fetal head |                         |                   |                                  |
| Yes                                        | 190 (92)                | 30 (86)           | 38 (100)                         |
| No                                         | 15 (7.3)                | 5 (14)            | 0 (0)                            |
| Unsure                                     | 1 (0.49)                | 0 (0)             | 0 (0)                            |
| No. of incidents of impacted fetal head    |                         |                   |                                  |
| During career (Mean (SD))                  | 24 (49)                 | 6.1 (8.9)         | 12 (14)                          |
| During last year (Mean (SD))               | –                       | 0.97 (1.6)        | 1.8 (2.2)                        |

NOTE: Data presented as n (% of total responses) unless stated otherwise.

emergency CS ( $n = 190$  (92%) obstetricians;  $n = 30$  (86%) midwives;  $n = 38$  (100%) obstetric anaesthetists). Of those with previous experience, obstetricians had observed 24 (range 2–300) cases, midwives had observed 6.1 (range 1–50) cases, and obstetric anaesthetists had observed 12 (range 1–70) cases.

Current use of various techniques to manage an IFH in healthcare professionals is shown in Table 2. The “push technique” (84%) and operating table tilted down (80%) were most commonly used by obstetricians, 89% of obstetric anaesthetists had previously administered a tocolytic agent to the mother, and 69% of midwives had previously utilised the “push technique”. Data regarding previous training received on the various techniques is provided in Appendix C.

All groups were asked to comment on their willingness to participate in a clinical trial and offer opinions on the acceptability of the various techniques for inclusion in a RCT aimed at managing an IFH during an emergency CS (Table 3). For obstetricians, the most highly accepted techniques for inclusion in a clinical trial, in order of preference, were insertion of fetal pillow ( $n = 178$  (%)), “push technique” ( $n = 107$  (%)) followed by “pull technique” ( $n = 107$  (%)). Of those that reported ‘other’, responses ranged from: ‘pushing the head up myself before starting the caesarean; using my non-dominant hand to deliver the head with the table tilted down;’ ‘standing on a step;’ and ‘patience and waiting for the uterus to relax with steady longitudinal traction’. Other responses included ‘using left hand to lift body up then inserting right hand below head’ and ‘rather than push the baby’s head up I request flexion of the head by a senior assistant i.e. not just blind pulling’. Information regarding obstetricians’ required training for the delivery of a clinical trial intended to manage an IFH is presented in Appendix D. The “push technique” was most highly accepted by midwives ( $n = 26$  (%)) and the administration of a tocolytic agent to the mother was most highly accepted by obstetric anaesthetists ( $n = 24$  (%)).

## Parents

A total of 259 parents completed the specific parent survey; 256 (%) of those had given birth in the previous five years and 3 (%) had a partner who had given birth in the given timeframe. Most respondents ( $n = 113$ , 44%) were aged 30–34 years. Of the respondents 196 (76%) reported one previous birth, 56 (22%) reported two and seven (2.7%) reported three previous births.

Parents were presented with a scenario and asked to report their

**Table 2**

Previous use of various techniques to manage an impacted fetal head in obstetricians, midwives and obstetric anaesthetists.

|                                                   |               | Yes, used technique before | No, not used technique before |
|---------------------------------------------------|---------------|----------------------------|-------------------------------|
| “Push technique”                                  | Obstetricians | 160 (84)                   | 30 (16)                       |
|                                                   | Midwives      | 24 (69)                    | 11 (31)                       |
| “Pull technique”                                  | Obstetricians | 90 (47)                    | 100 (53)                      |
|                                                   | Obstetricians | 12 (6.3)                   | 178 (94)                      |
| “Patwardhan method”                               | Obstetricians | 100 (53)                   | 90 (47)                       |
|                                                   | Midwives      | 4 (11)                     | 31 (89)                       |
| Insertion of fetal pillow                         | Obstetricians | 154 (80)                   | 39 (20)                       |
|                                                   | Obstetric     | 25 (66)                    | 13 (34)                       |
| Operating table tilted head down                  | Anaesthetists |                            |                               |
|                                                   | Obstetricians | 140 (74)                   | 50 (26)                       |
| Administration of a tocolytic agent to the mother | Midwives      | 4 (11)                     | 31 (89)                       |
|                                                   | Obstetric     | 34 (89)                    | 4 (11)                        |
| Insertion of a Tydeman tube into the vagina       | Anaesthetists |                            |                               |
|                                                   | Obstetricians | 1 (0.53)                   | 189 (99)                      |
|                                                   | Midwives      | 0 (0)                      | 35 (100)                      |

NOTE: Data presented as n (% of total responses).

**Table 3**

Willingness to participate, training requirements and appropriate techniques for the delivery of a clinical trial.

|                                     | Obstetricians | Midwives | Obstetric Anaesthetists |
|-------------------------------------|---------------|----------|-------------------------|
| Guide clinical practice?            |               |          |                         |
| Yes                                 | 179 (87)      | 35 (100) | 30 (79)                 |
| No                                  | 27 (13)       | 0 (0)    | 8 (21)                  |
| Willing to participate?             |               |          |                         |
| Yes                                 | 190 (92)      | 29 (83)  | 33 (87)                 |
| No                                  | 16 (7.8)      | 6 (17)   | 5 (13)                  |
| Further training required?          |               |          |                         |
| Yes                                 | –             | 28 (80)  | 18 (47)                 |
| No                                  | –             | 5 (14)   | 19 (50)                 |
| Not interested                      | –             | 2 (5.7)  | 1 (2.6)                 |
| Type of training required?          |               |          |                         |
| Lecture                             | –             | 11 (19)  | 4 (14)                  |
| Online                              | –             | 13 (22)  | 12 (41)                 |
| Demonstration                       | –             | 22 (38)  | 8 (28)                  |
| Hands-on                            | –             | 12 (21)  | 5 (17)                  |
| Other                               | –             | –        | 0 (0)                   |
| Appropriate techniques?             |               |          |                         |
| ‘Push technique’                    | 107           | 26       | 17                      |
| ‘Pull technique’                    | 107           | 2        | 11                      |
| ‘Patwardhan method’                 | 61            | 7        | 2                       |
| Insertion of fetal pillow           | 178           | 4        | 15                      |
| Operating table tilted head down    | 50            | 20       | 20                      |
| Administration of a tocolytic agent | 100           | 6        | 24                      |
| Insertion of a Tydeman tube         | 104           | 1        | 1                       |
| Other                               | 8             | –        | –                       |
| Unable to comment                   | –             | –        | 11                      |

NOTE: Where appropriate, data presented as n (% of total responses). Regarding acceptability, respondents could select multiple responses ( $\leq 4$  responses).

acceptability of various techniques to deliver a baby with an IFH during an emergency CS (Table 4).

Parents were also asked to report on the likelihood (on a Likert scale of 1 (least likely) to 5 (most likely)) of taking part in a study during labour to determine the best techniques to deliver a baby with an IFH. Ninety-eight (38%) respondents scored 3, 4 or 5 and one-hundred and sixty-one (62%) respondents scored 1 or 2. Participants who scored 1 or 2 were asked to report reasons why they would be unlikely to take part in such a study. One-hundred and one (63%) respondents selected that they would prefer for the doctor to deliver the baby in the way they felt most comfortable, 33 (20%) stated they did not like the concept of randomisation, and 27 (17%) would not like to have to think about a research study whilst in labour. Suggestions were made regarding a

**Table 4**

Parents’ acceptability of various techniques to deliver a baby with an impacted fetal head.

|                                                                 | Acceptable (scored 1 or 2) | Neutral (scored 3) | Unacceptable (scored 4 or 5) |
|-----------------------------------------------------------------|----------------------------|--------------------|------------------------------|
| “Push technique”                                                | 80 (31)                    | 64 (25)            | 115 (44)                     |
| “Pull technique”                                                | 152 (59)                   | 70 (27)            | 37 (14)                      |
| “Patwardhan method”                                             | 125 (48)                   | 78 (30)            | 56 (22)                      |
| Insertion of fetal pillow                                       | 132 (51)                   | 80 (31)            | 47 (18)                      |
| Operating table tilted head down                                | 148 (57)                   | 77 (30)            | 34 (13)                      |
| Administration of a tocolytic agent to mother                   | 150 (58)                   | 68 (26)            | 41 (16)                      |
| Insertion of a Tydeman tube into the vagina                     | 94 (36)                    | 84 (33)            | 81 (31)                      |
| Doctor to undertake procedure he/she felt most comfortable with | 211 (82)                   | 29 (11)            | 19 (7.3)                     |
| No preference                                                   | 73 (28)                    | 141 (54)           | 45 (17)                      |

NOTE: Data presented as n (% of total responses). Parents were asked to select 1 (very acceptable), 2 (somewhat acceptable), 3 (neutral), 4 (somewhat not acceptable) or 5 (not at all acceptable) for each technique.



combined decision tool; specifically, a combination of the doctor's judgement and the computer-generated result whilst considering the success of such techniques from previous deliveries. One woman also stated that she felt she would not 'make the best decisions whilst in pain and would prefer to be approached with comprehensive information before being in labour'.

## Discussion

### Main findings

Most health professionals had encountered an IFH at CS. The majority (79–100%) of health professionals stated that a trial in this area would help guide their practice and 87–92% would be willing to participate in such a trial. 38% of parents reported that they would be likely or very likely to take part in such a trial.

### Strengths and limitations

To our knowledge, this is the first national survey to understand health professionals' and parents' acceptability of various techniques for inclusion in an RCT aimed at improving the management of IFH. The main reasons reported by parents for declining participation in a RCT were that 63% would prefer for the doctor to deliver the baby in the way that they felt most comfortable, 17% would not like the delivery method to be computer generated and 17% would not like to have to think about a research study whilst in labour. These findings provide a valuable and novel insight into parents' views of the design of an RCT; this should be further explored prior to the design of an RCT.

The use of professional bodies to circulate the survey ensured that we were targeting appropriate groups in the UK. However, due to the method of distribution, it was impossible to establish a survey response rate. Due to the nature of the survey and for ease of completion, unique coding was not used for each participant, so in theory, duplicate entries could be possible. Our target number of responses was >100 responses from each healthcare professional group and parents. Whilst we received more than 200 responses from obstetricians and parents, we received only 38 and 35 responses, respectively, from the obstetric anaesthetists and midwife survey. This likely reflects the fact that IFH is an emergency where the operating surgeon determines the course of action and therefore IFH may be of less interest/importance to other staff members. Furthermore, the Tydeman tube is currently not licensed and is only used in two UK-based hospitals [13]. Therefore, whilst it was perhaps not surprising that only 0.53% of obstetricians stated its use for the management of IFH, a true representation of UK-wide acceptability and usages is presently not possible whilst the Tydeman tube is still unlicensed.

### Interpretation

To date, most research into IFH has been delivered in low income settings [14]. Despite initial recognition over a decade ago [15], there still exists no national guidance on appropriate techniques, no formal training and no consensus on best practice. Consequentially, professionals working in maternity continue to express a lack of confidence when attempting to manage an IFH [16].

Our findings agree with recent work by Cornthwaite et al. (2020) whereby the "push technique" was more commonly used (84% and 94%, respectively) than the "pull technique" (47% and 65%, respectively) [17], despite a review by Manning et al. (2015) concluding that the "pull technique" may result in less blood loss, fewer hysterectomy extensions, and shorter operating time than "push techniques" [18,19]. In this recent study, a lowering of the operating table was reported by 71% of respondents as the technique most used to deliver a baby with an IFH. However, in the current study, the head down tilt of the operating table was regarded as the least acceptable technique for the delivery of a clinical trial in the area. One of the reasons for these contrasting findings

may be that obstetric trainees, who were recruited, tend to favour less technical interventions such as head down tilt of the table, despite there being no evidence of its benefit as a technique to manage an IFH. These combined findings highlight the importance of understanding current practices in all relevant professionals, and an understanding of parents' acceptability of a clinical trial and reasons for participation and non-participation is crucial, in order to design a trial in this area.

### Future research

Parents expressed some uncertainties regarding participation in an RCT, therefore future qualitative work to explore women's views in more detail and understand how best to design and deliver an acceptable RCT intended to manage an IFH is essential. The survey data reported here forms part of a wider programme of work to design a feasible and acceptable RCT to manage an IFH.

## Conclusion

There is a lack of national guidance on appropriate techniques, no formal training, and no consensus on best practice for the management of an IFH during emergency CS. Currently, it is recommended that the adoption of techniques should be based on individual familiarity [18], which raises concerns regarding the ability of less experienced medical professionals to make appropriate decisions regarding the management of an IFH. The future development of clinical trials, involving relevant stakeholders in the design of such trials, is crucial to improve upon the guidance and training provided to staff who may encounter an IFH.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ejogrb.2022.01.033>.

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