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European Journal of Obstetrics & Gynecology and Reproductive Biology

journal homepage: www.journals.elsevier.com/european-journal-of-obstetrics-and-gynecology-and-reproductive-biology

Full length article

A new course on assisted rotational birth and complex caesarean section – Mixed methods evaluation of Art & Craft

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ARTICLE INFO

Keywords:

Obstetric training
Simulation training
Rotational birth
Assisted birth
Intrapartum ultrasound

ABSTRACT

Objectives: To assess the utility of Art & Craft – a new, hands-on course on Advanced Rotational Techniques and safe Caesarean biRth at Advanced/Full dilation Training aimed at senior Obstetrics trainees. The aims were to assess whether it improved confidence and skills in rotational vaginal birth, impacted fetal head at caesarean, and ultrasound for fetal position.

Study design: With ethical approval, pre- and post- course questionnaires and post- course interviews of attendees were conducted. A pre course questionnaire was emailed 1 week before the course. Attendees were asked to rate their confidence levels in performing vaginal examination and ultrasound assessment of fetal position, rotational ventouse, manual rotation, Kielland's rotational forceps, and disimpaction of the fetal head during second stage caesarean on a scale of 1 to 5. 1 = not confident at all and 5 = very confident. A post-course questionnaire with the same questions was emailed 3 days after. *p* values for differences in scores were calculated using the Wilcoxon signed rank test using Stata/MP 18 software.

Results: 32 trainees attended the course. 28 questionnaires were available for analysis. The majority 39 % were middle grade (ST3-ST5) level. Initial confidence was very low for rotational forceps (median 1/5). After attending the course and practical stations, respondents' confidence levels increased significantly ($p < 0.05$) across all domains; vaginal examination from 4 to 5, ultrasound for fetal position, rotational ventouse, and manual rotation from 3 to 5, disimpaction from 4 to 4.5, and Kielland's rotational forceps from 1 to 4.

Nine participated in post course interviews, which were thematically analysed. Participants expressed that the course gave them the opportunity to ask specific questions from experts to improve their confidence. A barrier to learning new methods was highlighted in that it is difficult to receive practical training in Kielland's, resulting in low confidence.

Conclusion: A practical, hands-on course on complex operative birth significantly increases trainee confidence levels in vaginal examination, ultrasound for fetal position, disimpaction, and techniques for rotational vaginal birth. The evaluation highlights that continued education and practise is required, even when trainees are senior. Evaluation of clinical outcomes after training is needed; and planned.

Introduction

While up to a third of first-time mothers have an assisted vaginal birth [1], rates are falling worldwide [2], with increasing rates of second stage caesarean section (CS) with an estimated incidence of approximately 5 % [3]. The trend is likely multifactorial, with a decrease in trainee experience leading to reluctance in attempting assisted vaginal births perceived as difficult [4]. Indeed, malposition in the second stage

of labour – occipito transverse or occipito posterior positions - affects up to 13 % of people, and is a major risk factor for adverse maternal and neonatal outcomes [5]. Moreover, people with a malpositioned fetus are up to six times more likely to have a second stage CS and up to four times more likely to require an assisted vaginal birth [6]. Malposition is associated with a longer second stage, postpartum haemorrhage, obstetric anal sphincter injury, and neonatal morbidity compared with rotating to an occiput anterior position [7]. Second stage CS, while

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Received 27 September 2023; Received in revised form 19 February 2024; Accepted 25 February 2024

Available online 28 February 2024

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necessary in certain clinical scenarios, increases the risks of intra-operative trauma, broad ligament haematomas, angle extensions [8], and preterm birth in future pregnancies [9]. Furthermore, impacted fetal head, when the baby's head is deeply engaged in the maternal pelvis, complicates approximately 5 % of all caesareans and 16 % of second stage CS [10].

The Royal College of Obstetricians and Gynaecologists (RCOG), UK, states that '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' [11]. With the above in mind, the RCOG introduced a compulsory course in the UK - the RCOG Operative Birth Simulation Training course (ROBuST) - in order to equip junior Obstetrics and Gynaecology trainees with relevant, hands-on training in both direct and rotational assisted vaginal birth (ventouse, forceps and Kielland's rotational forceps), as well as experience in impacted CS [12]. There have been very few, if any, training courses aimed at experienced practitioners and focussing on complex vaginal and caesarean birth.

We therefore developed an in-house, complimentary/refreshers course called Art & Craft (Advanced Rotational Techniques and safe Caesarean biRth at Advanced/Full dilation Training) based at University College London Hospital, UK, aimed at senior obstetric trainees/doctors. The objective was to develop and evaluate a low-cost course which provides practical training in both manual and instrumental rotational techniques, impacted head at CS, and intrapartum ultrasound (US); and to evaluate the course impact by assessing trainees' confidence levels with pre- and post-course questionnaires and interviews.

Material and methods

Ethics

Ethics for conducting the course evaluation and interviews was approved by the UCL Institute for Women's Health Low Risk Ethics Committee (IfWH_LREC_001_2022_3).

Course set up and structure

The course consisted of a series of talks in combination with practical stations (Fig. 1). It took place in the Fetal Medicine Unit at UCLH as space and scan rooms were readily available. It was advertised via email to all senior house officers (SHOs), specialty trainees in all years of their training (ST1-ST7) and specialty/staff grade doctors (senior doctors working under a consultant at registrar level, but not in the training program). Course participants were charged £120 to attend which included refreshments and lunch.

Ultrasound station

The US station involved attendees being taught to scan by Fetal Medicine consultants and senior ultrasound fellows using healthy pregnant volunteers with a single cephalic fetus ≥ 35 weeks' gestation. Each attendee had approximately 10 minutes each to practise scanning thereafter.

Rotational vaginal birth and impacted fetal head stations

For the practical stations on rotational ventouse, Kielland's rotational forceps, manual rotation, and impacted fetal head, attendees were split into groups of 5–6 with 2–3 faculty members (senior obstetricians

Times	Session
0830-0900	<i>Welcome - Tea/Coffee</i>
0900-0910	Introduction to course
0910-0925	Talk: Consent in Operative birth
0925-0945	Talk: Communication with patient and partner, and discussing options with patients who decline assisted vaginal birth
0945-1010	Talk: The neonatal perspective
1010-1025	<i>Break</i>
1025-1130	Station: USS – fetal position (2-3 people per group)
1130-1200	Talk: CS in second stage/impacted fetal head
1200-1245	Station: Disimpaction/Complex CS
1245-1315	<i>Lunch</i>
1315-1530	Stations: Groups to rotate: Kiellands Rotational ventouse Manual rotation (45 mins per session)
1530-1545	<i>Break – Tea/Coffee</i>
1545-1615	Talks: Current research
1615-1700	Opportunity for attendees to further practice any rotational techniques Closing comments

Fig 1. Art and Craft Course Structure.

and consultants) per group. Each group had 2 mannequins. The techniques were first demonstrated on a mannequin by a senior obstetrician, and the groups were split between the 2 mannequins (2–3 people per mannequin and instructor) in order to practise further and gain personalised feedback. All instrumental stations were performed using PROMPT Flex Models (limbsandthings.com) and the MODEL-med® Lucy and Lucy's Mum Instrumental Delivery Birth Simulator (modelmed.com), with Neville Barnes forceps, Kielland's rotational forceps, and Kiwi Omnicup ventouses.

Pre- and post-course questionnaires

Qualtrics software (Qualtrics, Provo, UT; qualtrics.ucl.ac.uk) was used to create both pre- and post-course questionnaires. As part of the course evaluation, participants were asked to rate their confidence levels between 1 and 5, with 1 being 'not confident at all' and 5 being 'very confident' in performing vaginal examination for fetal position, US assessment of fetal position, rotational ventouse, manual rotation, Kielland's rotational forceps, and disimpaction of the fetal head during impacted CS ([supplementary information 1](#)).

The course administrator emailed a link to participants to complete the pre-course survey 1 week prior to the course, and emailed a link to the post-course survey 3 days after the course. All participants were asked to fill the survey, and, if they agreed to take part in the post-course interview within 2–3 weeks, whether they'd be happy for their pseudo-anonymised information to be used for publication.

Statistical analysis

Stata/MP 18 software was used for statistical analysis. The Wilcoxon signed rank test for non-parametric paired data was used to generate *p* values for differences in confidence levels. A *p* value < 0.05 was deemed significant.

Qualitative analysis

JO, a human factors researcher trained in qualitative research methods performed the post course interviews. The interviews were semi-structured and focussed on the pre- and post-course confidence ratings. They were also asked for additional feedback that could help improve their confidence or the course in general. Each interview session took place within two weeks of the course, and was conducted online over Zoom. The interviews were audio recorded and transcribed using Otter.ai [13], a recording and transcription software. The transcriptions were saved to an online, password protected drive. The original recordings were then deleted. All participant data was pseudo-anonymised (P1, P2 etc) on saving, and analysed using Braun and Clarke's thematic analysis method [14]. As the interviews were based on survey data, the analysis was deductive and coded using NVivo [15], a software programme developed specifically for qualitative analysis.

Theory

There is increasing concern that with reduced training time, trainees are becoming deskilled in practical procedures [16], which contributes to the increase in second stage CS rates and concomitant decrease in instrumental births [17]. Simulation training plays a key role in educating medical students and trainees, allowing them to increase their knowledge base and confidence levels [18]. An effective Obstetric stimulation course can significantly reduce maternal and neonatal morbidity and mortality. PROMPT (Practical Obstetric Multi-Professional Training) has reduced rates of hypoxic ischaemic encephalopathy by 50 % in one hospital in the UK [19], and has reduced maternal deaths by 34 % in Zimbabwe [20].

It is imperative that the next generation of Obstetricians feel confident in performing emergency and instrumental births. Therefore, more

research should be conducted to reveal how stimulation can best support trainees. Furthermore, the RCOG states that 'ultrasound assessment of the fetal head position prior to assisted vaginal birth is recommended when uncertainty exists following clinical examination'. As it is imperative to know fetal position prior to assisted birth, people should thus be trained in its use.

Results

Two courses were held in November 2022 and May 2023, with a total of 32 people attending. Four of 32 returned questionnaires were excluded due to being unable to match the pre- and post-course ratings as participants did not provide their email addresses. This left 28 questionnaires to analyse. There were responses from 11 ST3-5s, eight ST6-7s, five specialty/staff grade doctors, and four SHOs (ST1-2 or equivalent).

Confidence scores

Median pre- and post-course confidence scores increased significantly across all skill domains. Using the Wilcoxon signed rank test, the increase in confidence levels was statistically significant across all stations. They increased from 4 to 5 in vaginal examination (*p* = 0.0002), from 3 to 5 in USS assessment of fetal position (*p* = 0.0003), rotational ventouse (*p* = 0.0000) and manual rotation (*p* = 0.0000), from 1 to 4 in Kielland's rotational forceps (*p* = 0.0000), and from 4 to 4.5 in disimpaction during CS (*p* = 0.0019). Please refer to [supplementary information 2](#) for a breakdown of individual scores (see [Table 1](#)).

Qualitative experience

Due to clinical commitments, only nine participants were available for interview within two weeks post-course. These ranged from senior house officers to those who had completed specialty training. The interviews lasted approximately 15 min. From these interviews, four themes were developed, which are summarised in [Table 2](#).

Reasons for attending

The commonest reason why people attended the course was to learn Kielland's rotational forceps as it is considered an advanced obstetric skill. P3, P4, and P6 all stated that this was the main reason to attend with P6 expressing 'I was looking forward to the practical aspect and being taught Kielland's not in an emergency situation... but with senior support in a controlled environment'. Additionally, participants had very specific questions about techniques that they wanted expert assistance with.

Confidence levels

Kielland's was identified by participants as a difficult skill to learn in clinical practice as it is a skill that is in decline. P3 shared that in some hospitals they have worked in there are many clinicians who are very pro-assisted vaginal birth, but in others the attitudes are quite different. Some participants relate this to a poor reputation with P9 saying 'it had quite a bad name because you're doing rotation with a metal instrument. If you're not doing it properly and you don't know what you're doing it can cause a lot of trauma. Because it was causing quite a lot of trauma, it fell very

Table 1
Median pre and post course scores with *p* values.

Skill	Pre course	Post course	<i>p</i> value
Vaginal examination	4	5	0.0002
USS fetal position	3	5	0.0003
Rotational ventouse	3	5	0
Manual rotation	3	5	0
Kielland's rotational forceps	1	4	0
Disimpaction	4	4.5	0.0019

Table 2

Summary of themes from qualitative studies.

Theme	Key finding
Reasons for attending	To learn Kielland's as access to it in practice is limited – 'I was looking forward to... being taught Kielland's' (P6)
Confidence levels	Confidence levels increased for all techniques, particularly Kielland's and Ventouse – 'the arts and craft course just helped me be a little bit more slick... and has given me some tips and tricks' (P9)
Consent	Talking to patients about potential techniques early can help with decision making during critical moments and reduce misinformation – 'it's really important that [alternate delivery methods have] been discussed in the pregnancy beforehand, but often that's not the case' (P5)
Course feedback	Having time to talk about lived experiences and techniques in a non-pressured environment is helpful – 'we don't always talk about the way we do things very openly' (P7)

quickly out of use.' Due to this shift, there is currently a 'lack of consultants who know how to do it... Therefore, not a lot of people can teach it' (P6).

Even after the training and participants' confidence in using Kielland's increasing, there are still barriers that would restrict them from using it in clinical practice. P9 clarified this issue with 'If I use a Kielland's and I get myself in trouble, chances are the consultant doesn't know how to get me out of trouble because they haven't done it either ever or not since they were in junior training.' Despite these concerns, the course was still able to provide training that increased participants' confidence in conducting Kielland's.

Ventouse was another instrumental method that some participants found challenging to master. P5 shared that they couldn't get answers to concerns they had in their clinical practice, but could in the course.

Consent

Obtaining consent from patients before conducting an assisted birth was discussed. P7 mentioned that in some hospitals where they have worked, when there is an emergency delivery, gaining consent at that time is pointless as the priority is on the health of the mother and baby. However, they acknowledged that it is mandatory to obtain consent, but recognised that the parents aren't in the right frame of mind to make an objective decision. P6 shared a similar opinion expressing, 'the patient's feelings do take a second kind of priority. I don't want this baby to have a brain injury. I don't want it to die. That mum is never going to forgive me. That mum's probably gonna forgive me that I've given her an episiotomy... I can talk to her after that. I can't talk to her after if the baby's dead.'

This led to a common barrier that several participants mentioned relating to misinformation within the general public. P4 shared patients often say 'I either want a straight forward delivery or I want a caesarean section' and they believe that the general population do not realise that most injuries associated with instrumental births are lower risk than an impacted caesarean, especially if it becomes a fully dilated second stage CS. P9 expressed that some mothers won't even consider an assisted delivery saying, 'Everybody wants to have their baby...in the water and nobody wants to hear about, what if it doesn't go the way we want it to go?' P3 summarised this sharing 'Oh, my sister's cousin's hairdresser had one and had X, Y and Z complication'.

Course feedback

Participants enjoyed the course as it provided the opportunity to improve or learn new techniques in a stress-free environment with P3 sharing 'it's really beneficial for us to attend to improve our skills so we can provide a better standard of care to patients.' Many participants shared that it was the conversations in the room that were really beneficial, with P4 sharing 'the lived experiences were really helpful and we don't do enough of that'. P7 shared a similar experience saying 'the conversations from my colleagues and my peers really helped because we don't always talk about the way we do things very openly. We may talk about a bad case with a colleague...but I'm not going to sit there and say I put my hand in like this and

then I delivered it like that'.

Participants also provided insight as to what could improve the course. One of the most significant being from P6 who shared 'the attrition rate for Obstetrics and Gynaecology is sky high' and felt that a discussion on clinicians' mental health and mental health support should be discussed more openly.

Discussion

This work highlights that although middle grade and senior doctors are often unsupervised on labour ward overnight and perform the majority of trials of assisted vaginal birth [21], which are the most complex, they still feel that their confidence levels and practical skills can be improved. Although the course significantly increased confidence in rotational techniques and impacted CS, there are still barriers to maintaining these skills, especially with regards to Kielland's forceps, as its use is declining due to perceived complications [22]. However, multiple studies have confirmed it is a safe and effective instrument to use for malposition in the second stage [22,23]. As aforementioned, rates of assisted vaginal birth are decreasing dramatically worldwide [17], and if current trainees lack the skills and training to perform Kielland's and other instrumental rotational births, they will become extinct. A new randomised control trial called ROTATE is currently taking place in the UK, and aims to compare manual rotation versus instrumental rotation during malposition of the fetal head in the second stage of labour, and whether they reduce the risk of maternal trauma without increasing the risk of second stage CS [24]. If the results favour certain rotational techniques with good safety profiles, then training in such deliveries must be made a priority.

A crucial aspect of feedback is the importance of mental health support for doctors performing complex births that can unfortunately lead to maternal and neonatal complications. To our knowledge, the impact of traumatic birth upon trainees' mental health has not been explored, and given the high attrition rates in the specialty, therefore should be.

Conclusions

A practical course on rotational assisted vaginal birth, US for fetal position, and disimpaction during CS significantly increases middle grade to senior trainee confidence levels in complex birth. While our sample size is relatively small, it shows that attending an additional course towards the middle/end of Obstetrics and Gynaecology training is extremely beneficial. Next steps would be to audit clinical outcomes to see whether it offers clinical benefit, but the results so far support a course such as this as part of advanced training of obstetricians.

CRedit authorship contribution statement

Shireen Jaufuraully: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Dawn Parris:** Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Jeremy Opie:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Dimitrios Siassakos:** Conceptualization, Funding acquisition, Supervision, Writing – review & editing.

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.

Acknowledgements

We thank the course administrator and all faculty members who volunteered their time to help teach.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ejogrb.2024.02.046>.

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