



## Invited Editorial

## Complex caesarean delivery



## ARTICLE INFO

## Keywords

Caesarean delivery  
Placenta accreta spectrum  
Training  
Simulation  
Surgical training

Between 2010 and 2018, 1 in 5 women gave birth by Caesarean delivery worldwide, with projections suggesting this will continue to increase over the coming decades [1]. In some regions and countries, such as in Latin America and Egypt, over 50% of births are by Caesarean delivery [1,2]. As a consequence, an ever-increasing number of women are having multiple repeat Caesarean deliveries. These are potentially more complex surgeries due to adhesion formation, scar dehiscence, and the risk of placental complications, including placenta previa and placenta accreta spectrum (PAS) [3–5], which significantly increase the risk of post-partum haemorrhage and Caesarean hysterectomy [6]. Overall, Caesarean delivery is a major contributor to the rising incidence of emergency peripartum hysterectomy, the rate of which is increasing in several regions, including the United States and Europe [7,8], and has been reported to have a nine times higher rate among women with a prior Caesarean delivery than among those without [9]. Furthermore, there is a direct correlation between the number of Caesarean deliveries and serious maternal morbidity, with a progressive increase in the rate of blood transfusion, surgical complications and adhesions with an increasing number of Caesarean deliveries [10].

Thus, it is critical that trainees in obstetrics and gynaecology receive appropriate training to safely care for this increasingly complex cohort of patients. However, their exposure to peri-operative care and abdominal surgery is diminishing as a result of several factors.

Firstly, the number of open gynaecological abdominal procedures is decreasing with the rise in minimally invasive surgery (MIS) (laparoscopic and robotic approaches) [11–13]. Open abdominal hysterectomy is becoming an increasingly rare procedure for benign gynaecological conditions, as a result of both alternative treatments such as hormonal intrauterine devices [14] and an increase in centres performing more benign hysterectomies using MIS techniques [11,12]. In addition, the overall number of hysterectomies being performed is falling rapidly in certain regions, such as the United Kingdom, where the rate fell by over 60% between 1990 and 2020 [15].

Secondly, increased numbers of trainees combined with working

time directives are reducing exposure to surgical procedures performed during speciality training [15–17]. As a result, trainees and trainers alike are losing confidence that current training models will equip them with proficient surgical skills [18,19]. In one survey, over 70% felt the training programme would not provide them with competency in general gynaecological surgery [18], while in another only 15% of trainees felt prepared to perform abdominal hysterectomy, which was a significant reduction from 40% in a survey performed 8 years previously [19].

Training bodies have yet to identify any adequate response to this worrying trend. The European Board and College of Obstetrics and Gynaecology has advised that, as abdominal hysterectomy rates decline, it is sufficient to have performed abdominal hysterectomy on simulation only for completion of the training curriculum [20]. Similarly, to obtain a certificate of completion of training from the Royal College of Obstetricians and Gynaecologists, abdominal hysterectomy is no longer a requirement as part of basic training and only needed as part of optional advanced training [21,22] – which most if not all pelvic surgeons would deem wholly inadequate.

It is clear that current trainees in obstetrics and gynaecology receive inadequate exposure to abdominal surgery, and competency in these procedures is no longer a requirement to complete speciality training. This is particularly concerning considering the increasing need for obstetricians to perform complex Caesarean deliveries. As a result, advanced pelvic surgeons and gynaecological oncologists are increasingly relied upon to manage these cases, in particular for conditions such as PAS [23–27]. While there are no pre-specified or standardised criteria of what defines competency to perform surgery for suspected PAS cases, a comprehensive understanding of pelvic anatomy, ability to meticulously dissect surgical plans and operate in the retroperitoneum is essential for such cases. Future obstetric trainees will be deficient in these essential skills. International guidelines for PAS care do not specifically recommend involvement of gynaecological oncologists in PAS surgery but, rather, suggest that those with “expertise in complex pelvic surgery” provide surgical care [28–30]. Some centres have

<https://doi.org/10.1016/j.crwh.2024.e00613>

Received 2 May 2024; Received in revised form 3 May 2024; Accepted 3 May 2024

Available online 10 May 2024

2214-9112/© 2024 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

demonstrated that dedicated experienced obstetricians working within a multi-disciplinary service can provide comparable maternal outcomes to gynaecological oncologists in PAS care [31]. However, in the era of MIS surgery, combined with reduced training hours and an increased number of trainees, it is increasingly likely that the “experienced pelvic surgeon” with expertise to perform complex Caesarean delivery and PAS surgery will be the gynaecological oncologist. A survey of gynaecological oncologists in the United States suggests that just over half are interested in participating in PAS surgery [26].

In order to try to address this deficit in surgical competence, complex obstetric surgical fellowships have emerged to better prepare obstetricians for procedures such as Caesarean hysterectomy, multiple repeat Caesarean deliveries, and operations on women with morbid obesity. The need for such fellowships highlights the increasing recognition that obstetric trainees are no longer gaining enough surgical exposure during basic training. Others suggest the solution is to incorporate more simulation exposure into obstetrics and gynaecology training curriculums, which has been shown to improve technical surgical skills [19,32–34]. However, surgery is far more than just technical skills and requires training in peri-operative care and management of complications. Others suggest more drastic measures are needed, such as a move away from the “Jack of all trades” approach of obstetrics and gynaecology training by separating the specialities, to ensure competency is retained in both [15,35]. While such measures may have the opposite effect and further reduce the surgical exposure of those pursuing training in obstetrics, it is clear sweeping and urgent action is required to ensure safe maternal care is provided as the global epidemic of rising Caesarean deliveries continues [36].

In conclusion, ensuring future obstetricians are competent surgeons prepared for increasingly complex Caesarean deliveries is a major challenge. Reliance on gynaecological oncologists is increasing. However, this is not a long-term solution to delivering care for complex Caesarean delivery and PAS services in the future. Strategies such as simulation training, appropriately designed fellowship programs, and a re-evaluation of current training criteria are essential to maintain surgical competence in the era of increasingly complex Caesarean deliveries.

### Contributors

The two authors contributed equally to the manuscript regarding the conception and design of the editorial, drafting the article and revising it critically. Both authors approve the final submitted manuscript.

### Funding

No funding from an external source supported the publication of this editorial.

### Provenance and peer review

This editorial was commissioned and was not externally peer reviewed.

### Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this editorial.

### References

- [1] A.P. Betran, J. Ye, A.B. Moller, J.P. Souza, J. Zhang, Trends and projections of caesarean section rates: global and regional estimates, *BMJ Glob. Health* 6 (2021).
- [2] A.M. Hussein, A. Ramzy, E. Jauniaux, Increasing caesarean delivery rates in Egypt: the impact of maternal request, *BJOG* 128 (2021) 807.
- [3] E. Jauniaux, et al., Perinatal assessment of complex caesarean delivery: beyond placenta accreta spectrum, *Am. J. Obstet. Gynecol.* 229 (2023) 129–139.

- [4] A.M. Hussein, R.A. Elbarmelgy, R.M. Elbarmelgy, M.M. Thabet, E. Jauniaux, Prospective evaluation of impact of post-caesarean section uterine scarring in perinatal diagnosis of placenta accreta spectrum disorder, *Ultrasound Obstet. Gynecol.* 59 (2022) 474–482.
- [5] B.D. Einerson, et al., Placenta accreta spectrum disorder: uterine dehiscence, not placental invasion, *Obstet. Gynecol.* 135 (2020) 1104–1111.
- [6] M.F. Higgins, C. Monteith, M. Foley, C. O’Herlihy, Real increasing incidence of hysterectomy for placenta accreta following previous caesarean section, *Eur. J. Obstet. Gynecol. Reprod. Biol.* 171 (2013) 54–56.
- [7] M. Givens, et al., Trends in unplanned Peripartum hysterectomy in the United States, 2009–2020, *Obstet. Gynecol.* 139 (2022) 449–451.
- [8] S. Triunfo, S. Ferrazzani, M. Volpe, G. Scambia, A. Lanzone, Old and novel insights into emergency peripartum hysterectomy: a time-trend analysis, *Arch. Gynecol. Obstet.* 301 (2020) 1159–1165.
- [9] A.F. Kallianidis, et al., Epidemiological analysis of peripartum hysterectomy across nine European countries, *Acta Obstet. Gynecol. Scand.* 99 (2020) 1364–1373.
- [10] N.E. Marshall, R. Fu, J.M. Guise, Impact of multiple caesarean deliveries on maternal morbidity: a systematic review, *Am. J. Obstet. Gynecol.* 205 (262) (2011) e261–e268.
- [11] P. Buderath, R. Kimmig, L. Dominowski, P. Mach, Hysterectomy in benign conditions: a 20-year single-center retrospective on the development of surgical techniques, *Arch. Gynecol. Obstet.* 307 (2023) 807–812.
- [12] D. Luchrist, O. Brown, K. Kenton, C.E. Bretschneider, Trends in operative time and outcomes in minimally invasive hysterectomy from 2008 to 2018, *Am. J. Obstet. Gynecol.* 224 (202) (2021) e201–202.e212.
- [13] C.H. Lin, C.Y. Long, K.H. Huang, T.S. Lo, M.P. Wu, Surgical trend and volume effect on the choice of hysterectomy benign gynecologic conditions, *Gynecol. Minim. Invas. Ther.* 10 (2021) 1–9.
- [14] K. Gemzell-Danielsson, et al., Thirty years of mirena: a story of innovation and change in women’s healthcare, *Acta Obstet. Gynecol. Scand.* 100 (2021) 614–618.
- [15] A.A.A. Ewies, Obstetrics and gynaecology: one specialty or two? *J. Obstet. Gynaecol.* 43 (2023) 2227031.
- [16] J.F. Magrina, Isn’t it time to separate the O from the G? *J. Minim. Invasive Gynecol.* 21 (2014) 501–503.
- [17] G.M. Gressel, J.R. Potts 3rd, S. Cha, F.A. Valea, E. Banks, Hysterectomy route and numbers reported by graduating residents in obstetrics and gynecology training programs, *Obstet. Gynecol.* 135 (2020) 268–273.
- [18] E.L. Moss, et al., Is gynaecological surgical training a cause for concern?: a questionnaire survey of trainees and trainers, *BMC Educ.* 11 (2011) 32.
- [19] D. Galvin, B. O’Reilly, R. Greene, K. O’Donoghue, O. O’Sullivan, A national survey of surgical training in gynaecology: 2014–2021, *Eur. J. Obstet. Gynecol. Reprod. Biol.* 288 (2023) 135–141.
- [20] E. P. t. c. [https://www.uems.eu/\\_data/assets/pdf\\_file/0004/64399/UEMS-2018.18-European-Training-Requirements-OBGYN.pdf](https://www.uems.eu/_data/assets/pdf_file/0004/64399/UEMS-2018.18-European-Training-Requirements-OBGYN.pdf), 2018.
- [21] R. a. t. c. a. h. <https://www.rcog.org.uk/media/xigldqql/advanced-training-definitive-document-2019.pdf>, 2019.
- [22] R. t. c. a. h. <https://www.rcog.org.uk/media/aoleiuj/s/definitive-document-core-curriculum.pdf>, 2024.
- [23] O. Touhami, L. Allen, H. Flores Mendoza, M.A. Murphy, S.R. Hobson, Placenta accreta spectrum: a non-oncologic challenge for gynecologic oncologists, *Int J Gynecol Cancer* (2022 Apr 27), <https://doi.org/10.1136/ijgc-2021-003325>.
- [24] H.C. Bartels, et al., Maternal morbidity in placenta accreta spectrum following introduction of a multi-disciplinary service compared to standard care: an Irish perspective, *Ir. J. Med. Sci.* 190 (2021) 1451–1457.
- [25] D.J. Brennan, et al., Surgical management of abnormally invasive placenta: a retrospective cohort study demonstrating the benefits of a standardized operative approach, *Acta Obstet. Gynecol. Scand.* 94 (2015) 1380–1386.
- [26] K. Matsuo, et al., Gynecologic oncologists in surgery for placenta accreta spectrum: a survey for practice, experience, and interest, *Int. J. Gynecol. Cancer* 32 (2022) 1433–1442.
- [27] J.L. Munoz, L.M. Blankenship, P.S. Ramsey, G.A. McCann, Importance of the gynecologic oncologist in management of caesarean hysterectomy for Placenta Accreta Spectrum (PAS), *Gynecol. Oncol.* 166 (2022) 460–464.
- [28] E. Jauniaux, et al., Placenta Praevia and placenta accreta: diagnosis and management: green-top guideline no. 27a, *BJOG* 126 (2019) e1–e48.
- [29] W.J.M. Bartels, R. Ní Mhuirheartaigh, D. Brophy, J. Moriarty, T. Geoghegan, D.J. C.M. O’Leary, G.C. Colleran, C. Thompson, N. Cooney, B. Byrne, P. Downey, R. Greene, S. Higgins, D.J. Brennan, National Clinical Practice Guideline: Diagnosis and Management of Placenta Accreta Spectrum, National Women and Infants Health Programme and The Institute of Obstetricians and Gynaecologists, 2022.
- [30] P. a. s. O. C. C. N. A. C. o. O. a. G. O. G. 2018;132:e259–e275.
- [31] V.J. Holmes, et al., Changes in practice and management of placenta accreta spectrum disorder: a 20-year retrospective cohort study, *Aust. N. Z. J. Obstet. Gynaecol.* 63 (2023) 786–791.
- [32] S. Kim-Fine, E.A. Brennan, Surgical simulation and competency, *Obstet. Gynecol. Clin. N. Am.* 43 (2016) 575–590.
- [33] C. Craig, G.D. Posner, Developing a Canadian curriculum for simulation-based education in obstetrics and Gynaecology: a Delphi study, *J. Obstet. Gynaecol. Can.* 39 (2017) 757–763.
- [34] F.J. Orejuela, et al., Gynecologic surgical skill acquisition through simulation with outcomes at the time of surgery: a systematic review and meta-analysis, *Am. J. Obstet. Gynecol.* 227 (2022) 29.e21–29.e24.
- [35] U. Pandey, S.W. Lindow, Should obstetrics and gynaecology be separate specialties? A survey of Yorkshire trainees, *J. Obstet. Gynaecol.* 26 (2006) 305–306.

[36] J. Sandall, et al., Short-term and long-term effects of caesarean section on the health of women and children, *Lancet* 392 (2018) 1349–1357.

<sup>c</sup> *Systems Biology Ireland, University College Dublin, Ireland*

Helena C. Bartels<sup>a</sup>, Donal J. Brennan<sup>b,c,\*</sup>

<sup>a</sup> *Dept of UCD Obstetrics and Gynaecology, School of Medicine, University College Dublin, National Maternity Hospital, Holles Street, Dublin 2, Ireland*

<sup>b</sup> *University College Dublin Gynaecological Oncology Group (UCD-GOG), Mater Misericordiae University Hospital and St Vincent's University Hospital, Dublin, Ireland*

\* Corresponding author at: UCD School of Medicine, Catherine McAuley Research Centre, Mater Misericordiae University Hospital, Eccles Street, Dublin 7, Ireland.

*E-mail address:* [donal.brennan@ucd.ie](mailto:donal.brennan@ucd.ie) (D.J. Brennan).