O&G
Magazine
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Caesarean section or vaginal birth?

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

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Sarah Ortenzio
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Sarah Ortenzio

Editorial Communications
O&G Magazine Advisory Group,
RANZCOG
254–260 Albert Street
EAST MELBOURNE, VIC 3002 Australia
(t) +61 3 9417 1699
(f) +61 3 9419 0672
(e) ranzcog@ranzcog.edu.au

Advertising Sales
Bill Minnis Director
Minnis Journals
(t) +61 3 9836 2808
(f) +61 3 9830 4500
(e) billm@minnisjournals.com.au

Printer
Southern Colour
(t) +61 3 8796 7000
(f) +61 3 9701 5539

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Caesarean section or vaginal birth

Women's health

Letter to the Editor

The College

RANZCOG Regional Committees

New Zealand
Dr Ian Page Chair
Jane Cumming Executive Officer
Level 6 Featherson Tower
23 Waring Taylor Street/ PO Box 10611
WELLINGTON 6011, NEW ZEALAND
(t) +64 4 472 4608 (f) +64 4 472 4609
(e) jcumming@ranzcog.org.nz

Australian Capital Territory
Dr Stephen Adair Chair

New South Wales
Prof Gabrielle Casper Chair
Lee Dawson Executive Officer
Suite 2, Ground Floor, 69 Christie Street
ST LEONARDS, NSW 2065
(t) +61 2 9436 1688 (f) +61 2 9436 4166
(e) nswadmin@ranzcog.edu.au

Queensland
Dr Carol Breeze Chair
Linda Cupitt Acting Executive Officer
Unit 22, Level 3, 17 Bowen Bridge Road
HERSTON, QLD 4006
(t) +61 7 3252 3073 (f) +61 7 3257 2370
(e) lcupitt@ranzcog.edu.au

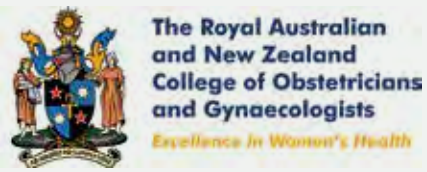
South Australia/Northern Territory
Dr Roy Watson Chair
Tania Back Executive Officer
Level 1, 213 Greenhill Road
Eastwood 5063
(t) +61 8 8274 3735 (f) +61 8 8271 5886
(e) tback@ranzcog.edu.au

Tasmania
Dr Emily Hooper Chair
Mathew Davies Executive Officer
College House
254–260 Albert Street
EAST MELBOURNE, VIC 3002
(t) +61 3 9663 5606 (f) + 61 3 9662 3908
(e) vrc@ranzcog.edu.au

Victoria
Dr Alison Fung Chair
Mathew Davies Executive Officer
College House
254–260 Albert Street
EAST MELBOURNE, VIC 3002
(t) +61 3 9663 5606 (f) + 61 3 9662 3908
(e) vrc@ranzcog.edu.au

Western Australia
Dr Robyn Leake Chair
Janet Davidson Executive Officer
Level 1, 44 Kings Park Road
WEST PERTH, WA 6005/PO Box 6258
EAST PERTH, WA 6892
(t) +61 8 9322 1051 (f) +61 8 6263 4432
(e) ranzcogwa@westnet.com.au

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
College House
254–260 Albert Street
EAST MELBOURNE, VIC 3002
(t) +61 3 9417 1699 (f) +61 3 9417 0672
(e) ranzcog@ranzcog.edu.au
(w) www.ranzcog.edu.au



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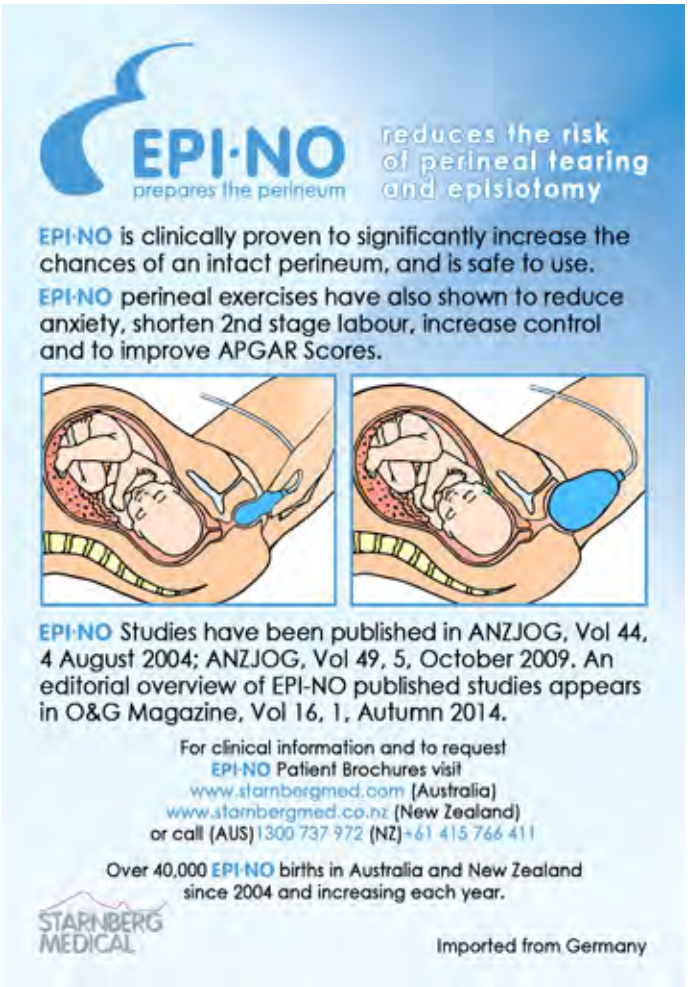
From the President

Prof Stephen Robson
President

I have written for *O&G Magazine* many times over the years, but this is my first attempt at penning the President's column. Making the switch has cheered me up, though, because the odds are that this will be the least-read article I have ever written. Taking over the Presidency of our College certainly feels like an honour, but with it comes a great sense of responsibility. I am acutely aware that my predecessor has left big shoes to fill. Prof Michael Permezel served two terms and has been involved in College Council and the Board/Executive for longer than I can remember. During Prof Michael Permezel's terms, our College faced the existential challenge of accreditation by the Australian Medical Council (AMC). Our continued existence depended on that accreditation process. As an organisation we did well, but many areas were identified where work and change were required. Michael provided superb leadership through this long and difficult process. Our responses to the AMC accreditation process have tested the College, but under Michael's close supervision and attention to detail, we are doing well. However, there is still more to do.

The work of the College Council and its Board are integral to the healthy function of our specialty as a thriving and innovative discipline. The new College Board loses not only Prof Michael Permezel, but also Drs Sarah Tout and Martin Ritossa, both of whom have made an enormous contribution and had a great impact on our College and its activities. They will be missed, and we should all be very grateful for their hard work over many years. Taking their places will be Dr Celia Devenish, Dr Ben Bopp and Prof Yee Leung. All three have long track records with the College and are keen to take on new responsibilities. I am very much looking forward to working with them, and indeed with all the members of College Council. I thank those who have recently left the College Council for their commitment, enthusiasm and productivity.

Earlier this year, I met with Dr David Richmond, the outgoing President of the Royal College of Obstetricians and Gynaecologists (RCOG), who has faced many challenges during his term. David was very blunt: 'if you achieve two of the things you hope to achieve during your term, you are doing well!' It was a sobering assessment, but made clear for me the dangers of over-reach, of trying to take on too many challenges and attempting too much change. Fortunately, I have a wonderful group of enthusiastic colleagues with whom to work, not only on College Council and the Board but



Prof Stephen Robson with Dr Kamo Dumo and Dr Jeffrey Tore, registrars at the Port Moresby General Hospital. October, 2016.

also in the Regional Committees. Our CEO, Ms Alana Killen, and the staff of College House and our regional offices are savvy and skilled. I hope everyone will have an appetite for some challenges over the next two years.

Women are pivotal to the health of our community. They generally oversee the health of their children and their partner. In many cases, women will be the strongest influence on health choices of grandparents and other relatives. For these reasons, the single most important path to improving community health and wellbeing is valuing and supporting women's health. This is what we are all about, and we must play to our strength. Everything we do as a profession, and through our College, must be done so as to value, enhance and continue to improve women's health.

Since our Fellows and Diplomates play the most important role in women's health across our two countries, making sure we select the best young doctors for training, and training them well, is of prime importance for the community. Many university medical courses undervalue women's health, so the recently developed curriculum for women's health must be promoted and embraced widely. Nurturing interest and talent in medical students and junior doctors by supporting the Pre-Vocational O&G Society (PVOGS) can help and should be encouraged. Since training time for our future specialists is limited, offering as much support to ensure that aspiring specialists enter the training program with good basic knowledge is key. Honing our selection processes so that the most suitable candidates enter training is critical.

The embracing of safe working hours and changes in the gender mix of our trainees place strains on service provision for hospitals. It is not acceptable, though, to sacrifice training for service needs. Training hospitals have to train, and the use of the online logbook by trainees will allow much closer monitoring of surgical experience, for example. The College is in complete agreement with the Australian Competition and Consumer Commission (ACCC) that we must not limit the number of specialists. However, we have a moral imperative to ensure that the trainees who become Fellows are adequately trained and prepared. The community demands this. That means hospitals not providing adequate numbers of cases to trainees will be on notice to improve, or potentially lose trainees to sites that can provide adequate procedural experience. Our assessment processes, too, have to be of the highest quality and in line with best practices to ensure the quality of our women's health workforce.

Fellows and Diplomates work in an environment where women's health is undervalued, and there is pressure on the health budget. We have a responsibility for stewardship of health expenditure. However, it is important that governments at all levels understand the importance of women's health, and that attracting and keeping the right doctors requires appropriate investment. I am intending to put considerable effort into building relationships with the Federal Government, in particular, to make sure our voice is heard. Continuing involvement in the Medicare Benefits Schedule (MBS) Review is fundamental to this, but so is nurturing productive and trusting relationships with various government departments. In this way we can position ourselves to shepherd and guide government decisions relevant to us.

A clear focus on training and standards has delivered a skilled Fellowship, and many years of hard work have put us in an excellent position. However, it should be a concern of all Fellows and Diplomates that the government is pushing ahead with revalidation. For the majority of our Fellowship, and those in private practice in particular, revalidation is the largest single threat to our practices and clinical autonomy. The experience of revalidation in the UK is not encouraging. I intend to put revalidation foremost in our list of challenges, and to tackle this head-on. Over the two years of my term, I am determined to solve the problems of revalidation for our Fellowship, and ensure this process is as easy to negotiate as possible. The College should provide the solution, not be part of the problem.

I believe the time has come to broaden our horizons as a professional body, and use our strengths to become the community's most trusted advocates for women's health in the broadest sense. Close to home, I am constantly disappointed by the misinformation – some of it dangerous – spread to women from unreliable websites and other media sources. We must move quickly to position ourselves as the key providers of trustworthy advice on all aspects of women's health in our communities. I have a number of strategies I hope to implement and will let you know how things are progressing shortly.

Many women in Australia and New Zealand, and close to us, face disadvantages and we must provide a strong voice to support them. As I write these words, I am at sitting at the Port Moresby General Hospital, and am in awe of the senior and junior staff that run the obstetrics and gynaecology services here. They do an incredible job in extremely difficult circumstances, and this is a pattern found across our near Pacific neighbours. Working to improve women's health across the Pacific should be a moral priority for all of us, and I am hoping to position our College as an agent of change.

In a similar way, many women within our own communities face enormous challenges. The College has partnered with the Migration Council Australia to develop a national strategy for migrant and refugee women's health. I am working with the President of the Public Health Association of Australia and our own Indigenous Women's Health Committee, and we are meeting senior Indigenous Affairs policy staff to build alliances to move forward in this area. Every woman in Australia and New Zealand, and every woman in our spheres of influence, should have access to the highest possible standard of healthcare. It should be a high priority for us all.

This issue of *O&G Magazine* deals with that most fundamental of issues: the birth and safety of the next generation. I can't think of a greater responsibility than ensuring the best-possible start in life for our children. It is our responsibility. I am very much looking forward to meeting, listening to, learning from and working with as many of you as possible over the next two years. Perhaps, if I'm lucky, in two years' time the next College President will be writing, 'my predecessor has left big shoes to fill…' May I wish every one of you an enjoyable and relaxing holiday season and, if you are on call, that it isn't too busy for you.

From the CEO

Alana Killen
CEO

It seems hard to believe that we are coming to the end of 2016; a year that has seen a number of changes and hopefully a successful year for those reading this issue of *O&G Magazine*.

Website

By now, most of you will have had the opportunity to look over the new RANZCOG website. This site has been designed to be user-friendly and easy to navigate; it has also been designed with specific audiences in mind. In keeping with the College's objective of raising awareness of the speciality, the website includes a section that outlines the role of an O&G specialist and the training required to achieve Fellowship.

There are also a number of other resources available for patients, including some excellent videos that provide information for patients preparing for surgery.

The website provides updates on current news and issues, both local and international, and I would encourage those of you who have not yet browsed through the site to visit www.ranzcog.edu.au. The website is mobile friendly, so can be used on phones and tablets.

Annual Scientific Meeting

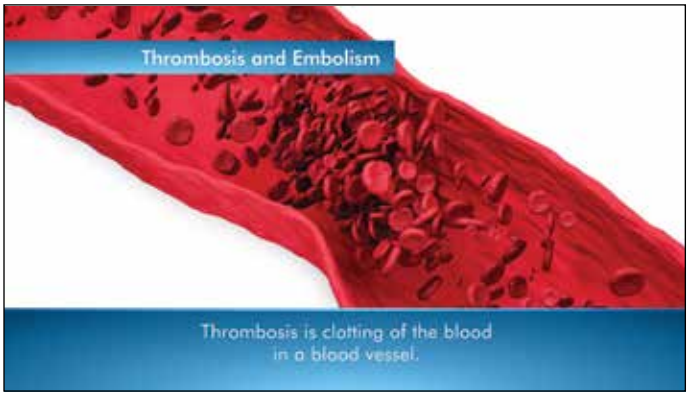
In October, I had the privilege of attending the College's Annual Scientific Meeting (ASM) in Perth. The meeting was an outstanding success and included delegates from Australia, New Zealand, the UK, USA and the Pacific region. The Organising Committee are to be commended for their hard work, energy and commitment and they were ably supported by RANZCOG staff. It was also an honour to sit in the audience and observe the joy of those receiving their Fellowship and that of their family and friends. Congratulations to all those graduating from the FRANZCOG Training Program in 2016 – we look forward to your involvement in the College.

Patient Information Pamphlets

At the ASM, RANZCOG launched the new suite of patient information pamphlets. These pamphlets are available for order on the College website and will be regularly updated to ensure the information provided is current. From February 2017, RANZCOG will no longer be affiliated with the Mi-Tec patient information brochures. Although these brochures will still be available from Mi-Tec, they will not be endorsed by RANZCOG and will no longer carry the RANZCOG crest. The RANZCOG patient information pamphlets have been developed through a rigorous and stringent process, but are written in a way that is suitable for the intended audience (women and their families). It is hoped that these pamphlets will shortly be available in a number of languages. A sample pamphlet, Labour and Birth, has been included with this issue of *O&G Magazine*.

With more focus on patient information, the new website is delivering on the College's commitment to 'excellence in women's health'.

The news section of the website, highlighting stories that are relevant to the specialty, can be easily navigated to from the home page.



Patient information videos are designed to help with the consent process. This screenshot is taken from the hysterectomy video.

Supporting Respectful Workplaces

Last year at this time, I referred to the events leading up to and concerning the Royal Australasian College of Surgeons' (RACS) survey into incidences of bullying and harassment. This year, RANZCOG embarked upon its own survey and the results of this were included in my report in the previous issue of *O&G Magazine*. Since that time, RANZCOG has established a Working Group that has as its remit 'Supporting Respectful Workplaces'. This Working Group will establish a plan for addressing the cultural issues that exist in some areas of the specialty and for raising awareness of the need for respectful and professional relationships.

When the 2016 Australian of the Year, former Lieutenant-General David Morrison, famously stated 'the standard you walk past is the standard you accept', the significance was not lost on many who had experienced poor treatment from others, but received no support. It is difficult to 'call out' inappropriate or unacceptable behaviour from colleagues or peers, and yet that is what needs to happen if mutually respectful workplaces are to thrive. It is also important to establish a shared understanding of teaching and training; when does feedback become humiliation and what roles do resilience and generational difference play in this paradigm? The College will be developing resources to address these issues and these will be available online in the coming months along with additions to existing workshops and changes to the annual training survey. Cultural change is not an overnight process, but with increased awareness and shared responsibility, improvements will gradually occur.

Revalidation

Although Henry David Thoreau claimed 'what is once well done is done forever', in a world that is experiencing change at the most rapid rate in history, this probably needs to be amended to read 'what is once well done will need to be revalidated'. The spectre of revalidation has raised the ire of doctors across the country (one only needs to read the submissions on the Medical Board of Australia's website to attest to this); however, it seems inevitable that specialists will be required to participate in some form of revalidation in the very near future. RANZCOG is mindful of this looming obligation and is planning to ensure Fellows are provided with a program that is efficient, effective and easy to use. In 2017, the College will invest in upgrading the CPD Online platform and this will also take into consideration the requirements of the Medical Board for practitioners to demonstrate ongoing competence.

Engagement

The College continues to explore strategies for engaging more effectively with its members and making the organisation more accessible for those wishing to have greater involvement. As with many Colleges, the majority of the work is undertaken by a core group of hard-working individuals who often make significant personal and professional sacrifices for the sake of their roles. We continue to be indebted to those who so do so much for RANZCOG, the profession and for women's health in general. My personal thanks go to the Board and staff for their support during the past year.

I hope you enjoy a safe and restful holiday period with your families, friends and loved ones. I look forward to working with you in 2017.

Editorial

Dr Rupert Sherwood
FRANZCOG

After 33 years practising obstetrics, it was with initial enthusiasm, subsequently tempered with a liberal dash of caution, that I accepted the invitation to write the editorial for this issue of *O&G Magazine* themed 'caesarean section or vaginal birth'. However, I was pleased to see that neither the words 'normal' nor 'natural' had been co-opted in the title to accompany either mode of birth.

Obstetrics is a relatively simple art – after all is said and done, there are only two ways to give birth. Why then, do we as obstetricians commonly undertake with the very best intentions an operation that must surely be the most politicised medical procedure ever? Why is operative birth 'abnormal', and any form of vaginal birth 'normal'? We all sit in morning handover and hear the night registrar describes a 'normal' vaginal birth with a third-degree tear and 1.8 L postpartum haemorrhage – another caesarean statistic avoided.

How have we got to this point in one of the most collaborative professions in healthcare? We as clinicians quite rightly follow careful guidelines when consenting patients for caesarean section (CS), grappling with evolving data on risks for future pregnancies, including future placental disasters and even possibly stillbirth, but can still be left with the impression some other course of action may have been better.

Reading through his issue of *O&G Magazine*, I reflected on how much intellectual rigour and, where possible, evidence-based opinions, have been applied to this often emotive debate about CS. The broad scope and detail of the contributions left me wanting to see this issue of the magazine in the newsagents, supermarkets and airport shops alongside all the celebrity pulp, as a way of putting a more balanced view on mode of birth to our target audience.

The operation CS is, as pointed out by Frances Hills (page 15), the most commonly performed surgical procedure for women. The indications are many and varied, ranging from patient requested elective CS to the more dramatic and challenging procedures performed for placenta praevia accreta that may culminate in an undoubtedly lifesaving peripartum hysterectomy. When all these indications are bundled into one clinical indicator (CS rate expressed as percentage), its usefulness as a quality improvement or audit tool is impaired, but sometimes, unfortunately, the raw rate of CS does provide a focus for those who believe emphatically that 'less is best' when it comes to CS. Perhaps we should occasionally ask the question: 'is my/our CS rate high enough?'

Robson's classification[1] of CS indications into 10 mutually exclusive groups did much to allow clinicians to audit with improved focus and clarity, and attempts to modify CS rates within these groups allowed evidence-based changes to be assessed for effectiveness within a defined quality and safety framework.

In obstetrics, it is paramount to be clear as to the difference between association and causation when examining specific outcomes. The debate that continues around CS, particularly with respect to the indications for, and outcomes from, CS, exemplifies the importance of this distinction, as emphasised in the articles in this issue.

Several of the articles in this issue encourage us to focus not only on the immediate peripartum factors, but also to consider the longer-term effects of our advice to parents about mode of birth on the infant, child and possibly the adult. I admit to some initial eye-rolling and heavy sighing when vaginal seeding was first broached with me at an emergency CS, but the article by Chu et al (page 47) clearly puts the case for at the very least better understanding of evidence and arguments in the current literature relating to the neonatal microbiome and its possible influence on future health. Broader than just the microbiome are the issues of child and adult health that may be influenced by mode of birth, as described by Bendall and Ellwood (page 20).

Healthcare is all about costs in our current era of finite funding. The article by Thevathasan and Woodrow (page 26) explores the comparative costs of several modes of birth, and concludes that accurate estimates of health expenditure are limited by a variety of factors.

Lastly, the issue of consent for both modes of birth is now very much to the forefront of debate around birth, and no discussion that includes the phrase 'woman's right to autonomy and choice' can exclude this topic, as detailed in the paper by Lin and Atan (page 22). A detailed and timely discussion during the antenatal period must now include risks of pelvic floor injury and the longer term consequences with respect to continence, sexual function and quality-of-life issues.

The key message is respect for all opinions, while continuing to oppose the demonisation of a surgical operation that has undoubtedly contributed to the health and wellbeing of countless mothers and babies over the last two centuries. Espousing the mantra of 'woman-centred care' is only the beginning: it is how we as clinicians apply our knowledge, intellect and empathy to empower through information those who place their trust in our professions that we may be judged to be good and competent obstetric care-givers.

Reference

1 Quality assurance: The 10-Group Classification System (Robson classification), induction of labor, and cesarean delivery Robson, Michael et al. *Int J Gynaecol Obstet*, Volume 131, S23 - S27. DOI: http://dx.doi.org/10.1016/j.ijgo.2015.04.026.

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Caesarean section: an evidence review

Dr Frances Hills
MBBS
FRANZCOG Advanced Trainee
Nambour Hospital

Caesarean section (CS) is the most commonly performed major operation for women worldwide. In Australia in 2011, 95 894 women gave birth by CS, which equates to approximately one in three deliveries.[1] This rate has increased from 18 per cent of births in 1991, to the current rate of over 30 per cent.[1] Compared with vaginal birth (VB), mothers who undergo CS have higher rates of morbidity, including the serious morbidities of major puerperal infection and haemorrhage leading to hysterectomy[2] and mortality.[3] In the past, Berghella et al summarised the evidence base for performing various steps in a CS[4] and this advice has recently been updated.[5] The purpose of this article is to present a snapshot of the current evidence-based guidance for making the myriad surgical decisions required during the performance of a CS, either elective or emergency, and to touch on some of the important preoperative considerations. We should endeavour to standardise the performance of the procedure and avoid unnecessary steps, in order to minimise morbidity and mortality for the women and babies under our care.

Preoperative considerations

Prophylactic antibiotics

There is strong evidence to support the use of a single dose of ampicillin or a first-generation cephalosporin, such as cephazolin, for all women undergoing CS, as this leads to a significant reduction in infectious morbidity (>60% less endometritis, 25% less wound infections in the elective setting and 65% less in emergency CS and an overall reduction in fever and urinary tract infection [UTI]).[4] Timing of administration should ideally be 15–60 minutes prior to skin incision, as this has been shown to further reduce endometritis risk and total morbidity from infection without any impact on neonatal sepsis or neonatal intensive care unit (NICU) admissions.[5] Outcomes are not improved with multiple doses and, until recently, no data supported using a more broad-spectrum regime.[5]

A large prospective multicentre randomised controlled trial (RCT) involving 2000 women has just been published, looking at the addition of azithromycin 500mg IV. This study found that for the azithromycin group, the rate of composite infectious outcomes was halved (6.1% versus 12%).[6] The trial group was, however, high risk, with only those having had an emergency CS being included, and with greater than 70 per cent of women having a BMI of over 30.[6] The question remains as to whether a higher dose of cephazolin for obese women would lead to the same reduction in infectious morbidity, as there are data to indicate that 2 g does not reach the minimal inhibitory concentration for this group of women.[7] Further research is needed in this area.

Thromboprophylaxis

This is an area largely devoid of evidence to guide our practice.[5] However, venous thromboembolism (VTE) remains the second leading cause of direct maternal death in Australia,[8] and is an important cause of the excess mortality associated with CS.[3] As such, an assessment of the VTE risk of each woman should be consistently undertaken. A number of guidelines have been developed based largely on expert opinion, such as those by McLintock et al.[9] As a minimum for all women undergoing CS, it is recommended that compression stockings, early mobilisation and adequate hydration be implemented.[9] In addition, chemical thromboprophylaxis is recommended for all women having had an emergency CS for ≥5 days or until fully mobile.[9]

Vaginal preparation

Vaginal preparation preoperatively with povidone-iodine solution has been the subject of a Cochrane review, which included four trials (n=1198). The review found that endometritis rates were significantly reduced by this practice (5.2% versus 9.4%, RR 0.57), with the reduction being particularly significant for women with ruptured membranes (1.4% versus 15.4%, RR 0.13).[10] Given this evidence, we should consider making this simple and cheap intervention part of our routine practice, particularly in the emergency setting.[10]

Use of an indwelling catheter

Interestingly, there are some data that support not placing an indwelling catheter (IDC) prior to CS, as the rate of UTI is reduced significantly (0.5% versus 5.7%) and there is no difference in the occurrence of urinary retention. However, to date, the available studies have been underpowered to detect a difference in the uncommon, but important, outcome of urinary tract injury.[5]

Skin preparation and hair removal

Until recently, there has been minimal good-quality evidence to guide our practice with regard to skin preparation, as pointed out in a Cochrane review conducted in 2014.[11] Since then, two further RCTs have been performed comparing chlorhexidine-alcohol with iodine-alcohol; one which found no difference in surgical site infection[12] and the second published recently, involving 1147 patients, that found a lower rate of surgical site infection with chlorhexidine-alcohol preparation (4.0% versus 7.3%, RR 0.55, P=0.02).[13] In light of this, the current evidence would support the use of chlorhexidine-alcohol preparation.

When hair removal is necessary preoperatively, it is recommended to do so via clipping rather than shaving, as this is associated with fewer surgical site infections.

The procedure

Abdominal entry techniques

The Joel-Cohen technique, as compared to a Pfannenstiel incision, is associated with less fever, pain and analgesic requirements, reduced blood loss and operative time and a shorter hospital stay.[5,14] No long-term data are available comparing the two, but given these short-term benefits, one should use the Joel-Cohen technique when feasible (it may not be practical in the setting of significant adhesions from prior surgery where sharp dissection is usually required). The Joel-Cohen technique involves making a straight transverse incision 3 cm below the level of the anterior superior iliac spines, with the subcutaneous tissues opened only in the middle 3 cm and the rectus sheath incised transversely in the midline.[15] The subcutaneous tissue and rectus sheath is then extended laterally with blunt dissection, which is also used to separate the rectus muscles vertically and laterally and open the peritoneum.[15]

Development of a bladder flap is considered part of the Joel-Cohen technique, and this has been the subject of three RCTs.[4,5] Omitting bladder flap development is associated with shorter incision to delivery intervals with no change in the rate of other complications; however, trials are currently underpowered to assess risk of bladder injury.[5]

Uterine incision

A lower segment transverse uterine incision is performed where possible. This should begin with a small incision made sharply with a scalpel. Blunt, as opposed to sharp, expansion of the uterine incision results in reduced blood loss and postpartum fall in haemoglobin.[5] Furthermore, cephalad-caudad versus transverse blunt expansion results in significantly less unintended extensions of the uterine incision (3.7% versus 7.4%), and a reduction in estimated blood loss (EBL) over 1500 mL (0.2% versus 2.0%).[5]

Delivery of the placenta

There is strong evidence to support routinely practising spontaneous delivery of the placenta (using cord traction and fundal massage) as compared with manual removal. Spontaneous delivery has been associated with lower rates of endometritis, less blood loss, lower falls in haematocrit and shorter hospital stays.[4,16]

Preventing postpartum haemorrhage

Available evidence supports the routine use of intravenous oxytocin or carbetocin for the prevention of postpartum haemorrhage (PPH) at CS. Various dosage regimens for oxytocin have been used in trials, which show benefit from oxytocin infusion with unknown benefit from oxytocin bolus.[5] Carbetocin appears equivalent to oxytocin, with the exception of requiring fewer additional oxytocic agents.[5] The cost effectiveness of carbetocin has yet to be established.

Trials assessing tranexamic acid as a preventative agent for PPH at elective CS have been undertaken and show a significant reduction in blood loss (100–200 mL), an EBL >1000 mL and the need for additional uterotonic agents.[5] Data are currently lacking on potential serious adverse effects, such as VTE, which should be available before any change in routine practice.

Exteriorisation of the uterus and closure of the uterine incision

Exteriorisation of the uterus has not been associated with any significant differences in febrile complications, surgical time, blood loss, intraoperative nausea, vomiting or pain, compared with intra-abdominal repair, and so either approach is considered reasonable, depending on practitioner preference.[5,17]

The debate regarding single- or double-layer closure of the uterus continues. Short-term outcomes are comparable; however, operating time may be reduced with a single-layer closure.[5,18] Evidence derived from case-control and cohort studies suggests that a double-layer closure reduces the future risk of uterine rupture,[5] and there is some RCT evidence showing that a single-layer closure and a locked first layer are both associated with thinner residual myometrial thickness.[18]

Presently, RCT data are insufficient to draw conclusions regarding single- versus double-layer closure and future uterine rupture risk. A single-layer closure is considered appropriate for a woman with no desire for future fertility,[5] otherwise it would seem prudent to continue the practice of a double-layer, non-locking, closure.

Peritoneal closure

Non-closure of the peritoneum has been shown to have short-term benefits for women, including less postoperative fever, shorter operating times and reduced hospital stays.[4] Closure of the visceral peritoneum is also associated with increased urinary frequency, urgency and stress incontinence in the short term.[19] There are some long-term data that do suggest reduced intraabdominal adhesion formation when peritoneal closure is performed; however, the evidence regarding this remains limited and inconsistent at present.[5,19] Currently, on balance, the evidence remains in favour of non-closure.[19]

Summary

In summary, as outlined by Dahlke et al, there is good evidence to support the following practices at CS:

- prophylactic antibiotics prior to skin incision
- cephalad-caudad blunt uterine incision extension
- spontaneous delivery of the placenta
- oxytocin infusion for PPH prevention
- single-layer uterine closure for women not desiring future fertility and closure of the subcutaneous tissue when the thickness is <2 cm.[5]

Further research is still required surrounding various CS techniques, especially in regards to long-term outcomes for double-layer uterine closure and peritoneal closure. In regards to prophylaxis, ideal antibiotic prophylaxis for obese women, who now comprise a significant proportion of our population and are at higher risk of infectious morbidity, requires further research to ensure this is optimised, whether it be with a higher dose or more broad spectrum regime. VTE and PPH prophylaxis (with respect to the use of Tranexamic Acid) require further attention, given their importance in relation to maternal morbidity and mortality. Finally, as clinicians, we should endeavour to perform and teach this common operation using an evidence-based approach, and be willing to change our technique when the evidence shows us we ought to, for the wellbeing of the women we serve.

Rectus sheath closure

There have been no RCTs to evaluate the optimal technique for closure of a transverse incision of the rectus sheath. Generally speaking, the sheath is closed with a continuous technique using a slowly absorbable suture, such as a 0 or 1 vicryl or polydioxanone (PDS) suture, with PDS maintaining greater tensile strength in vivo for longer than vicryl.

Subcutaneous tissue

Closure of subcutaneous tissue where the thickness is ≥2 cm reduces wound disruption (RR 0.66) and seroma formation (RR 0.42) and hence should be routine practice.[4] There is no evidence to support closure when the thickness is ≥2 cm and the addition of a subcutaneous drain has not been shown to provide any additional benefit.[4,5]

Skin closure

Subcutaneous sutures, as compared with staple use, have been found to significantly reduce wound separation rates, with no significant differences in wound infection, haematoma, seroma or readmission rates, or cosmetic outcome.[20] Suturing takes on average seven minutes longer.[20] It should be noted that the higher wound separation rate was associated with staple removal on or before day four,[21] so both techniques are likely equivalent with later removal of staples.

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Caesarean rate: rising tide or smooth seas?

Prof Stephen Robson
RANZCOG President

It is common to read in the lay press that there is an 'epidemic' of caesarean sections (CS), or that there is an ever-rising 'tide' of caesarean births in the learned journals.[1] These terms sound very worrying, and maternity carers are commonly asked about this. To make things worse, we are told the World Health Organization (WHO) recommends that the maximum rate of caesarean birth should be no more than about 15 per cent. Why is this happening? Is the news all bad? Who is to blame for this 'disaster'?

The rate of caesarean birth in Australia has certainly increased: in 1993, 19 per cent of all births were caesarean.[2] Twenty years later, in 2013, that rate had increased to almost 33 per cent.[3] At first glance this seems to be a big change, but lots of things have changed since then. For example, the median house price in Sydney was $188 000 in 1993, and mortgage interest rates were close to 10 per cent. By 2013, the median house price in Sydney was $625 000. Look at interest rates now!

Over the last decade, the rate of CS appears to have reached a plateau (Figure 1). Indeed, between 2012 and 2013 the CS rate increased by only 0.13 per cent (from 32.35% to 32.77%), or an additional 392 caesareans across the whole country.[3] The only age groups in which there was a significant increase in the CS rate were teenaged mothers (comprising just slightly more than 10 000 births across the country) and women aged 24–29 years of age. In all other age bands, there was no statistically significant change in CS rates (Table 1). These are not the typical changes seen in an epidemic.

Caesarean birth is obviously more common than it was 20 years ago, but increases in the rate appear to have stabilised. For some people, the question now is almost the reverse: why aren't rates of CS continuing to increase? And why did the WHO ever recommend a maximum rate of CS in the first place?

Since 1993, there have been major changes in the demography of women having babies. Twenty years ago the number of obese women who delivered was so low, in general, that statistics were rarely kept. Today, fewer than half of women who deliver are within the normal healthy weight range. About one-quarter are overweight, and almost one-in-five new mothers are obese.[3] This change is important, because women who are obese are much more likely to have a caesarean delivery.[4] Since the rate of obesity in reproductive-age women continues to increase, it seems remarkable that the CS rate appears to have plateaued.

Another change has been the age distribution of women having babies, particularly their first babies. Twenty years ago, births to women aged 35 years or more were uncommon – only 11.7 per cent were to women in this age group, with only 1.6 per cent of births to women aged 40 years or older.[2] The proportion of older women has doubled, with 22.3 per cent of women now aged 35 years, and the proportion of women aged 40 years or more has almost tripled to 4.4 per cent.[3] Maternal age is strongly associated with caesarean birth,[5] so a major shift in the age demographics of women having babies will be another contributor.

One of the important issues to consider when counselling women about caesarean birth is the effect of multiple CS. Risks of severe potential pathologies, such as placenta accreta, begin to mount from the third CS onwards. Women who plan for large families should avoid CS if safely possible. Yet such families are now a rarity and parity has fallen dramatically. In Australia at present, only 20 per cent of women have three or more children and women having four or more children now constitute a mere 3.4 per cent of all births.[3]

Both obstetricians and women now seem less inclined to take risks with birth, and new information has emerged. Attempts at vaginal breech delivery have lost much of

Table 1. Comparison of rates of caesarean section by age band in Australia, 2012 and 2013. Data from the AIHW Australia's Mothers and Babies series.[3]

Age band (years)	2012 (%)	2013 (%)	OR	95%CI	*p*-value
<20	17.1	18.3	1.09	1.01–1.17	0.02
20–24	22.3	23.5	1.02	0.98–1.05	0.36
25–29	28.1	28.7	1.03	1.00–1.05	0.02
30–34	34.6	34.7	1.00	0.99–1.03	0.52
35–39	42.3	41.6	1.01	0.99–1.04	0.35
>39	49.9	50.6	1.03	0.98–1.08	0.24

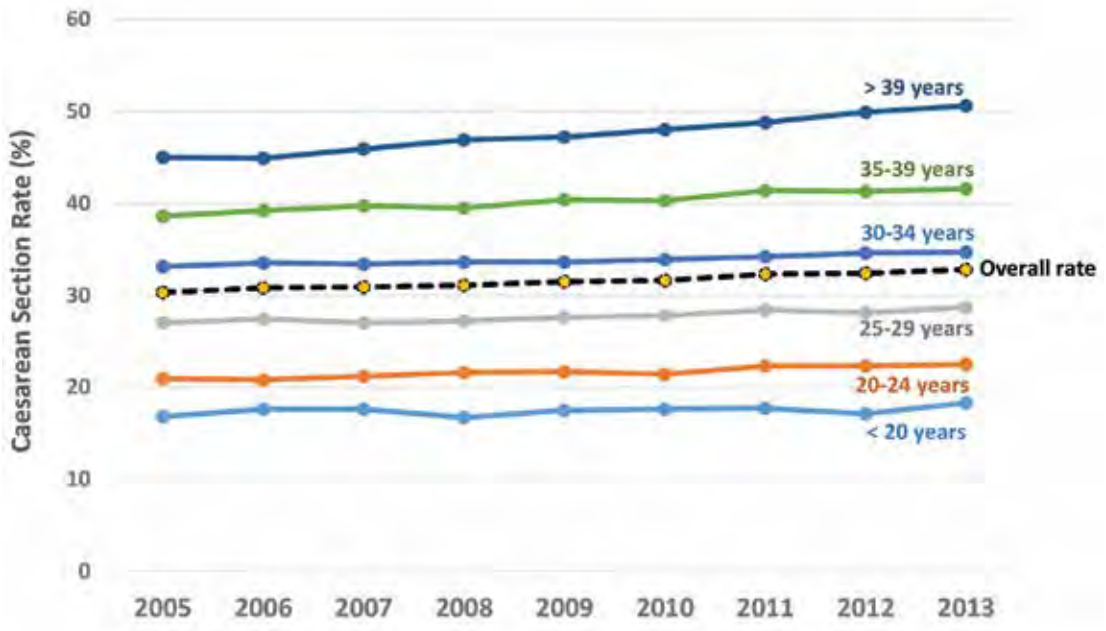

Figure 1. Rates of caesarean section by age band in Australia, 2005–13. From the AIHW Australia's Mothers and Babies series.[3]

their allure with new safety concerns,[6] and there is evolving evidence that adventurous attempts at vaginal birth are not necessarily good for women in the long term.[7] The medicolegal environment has changed as well, with ever-greater consideration of the potential for adverse outcomes of vaginal birth.[8] Studies from Australia[9] and overseas[10] confirm that one of the most common indications for CS is having had a previous CS. Women whose first child is delivered by CS are likely to have all subsequent children by repeat CS.[11] On the other hand, for Australian women whose first birth is vaginal, all subsequent children are likely to be delivered vaginally.[12]

So where did the original WHO recommendation for a maximum CS rate of 15 per cent come from in the first place? It resulted from data suggesting that a number of countries with low perinatal mortality rates had low rates of CS.[13] More recent and detailed analysis has shown this assumption to be flawed, with a value closer to 20 per cent as a more reliable figure.[14] However, taking very blunt endpoints, such as neonatal mortality, as the basis of a recommendation for target CS rates is a very narrow way to make this call. Prof Caroline de Costa and I have recently argued elsewhere that other endpoints such as prolapse and incontinence in later life are equally valid and are not taken into account in the WHO recommendation.[15]

Ultimately, attempts to reduce the rate of caesarean birth have been spectacularly unsuccessful, both in Australia and overseas.[16] It seems that despite continuing changes in the demographics of women having children in Australia – increases in age and weight – the rate of caesarean birth has stabilised. Preventing a woman's first caesarean birth is probably the key to reversing the rates in the long term, but doing this safely is very difficult to do. One thing that is certain is that nobody should be blithely referring to the WHO recommendation anymore; except as an interesting piece of history.

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Neonatal outcomes: what's best for mother and baby?

Dr Alexa Bendall
CMFM
Advanced FRANZCOG Trainee

Prof David Ellwood
MA DPHIL (OXON) FRANZCOG DDU
CMFM
Professor of Obstetrics & Gynaecology,
Deputy Head of School Research
Griffith University
Director of Maternal-Fetal Medicine
Gold Coast Health District

We all want the best-possible outcomes for those we care for. The acceptable level of risk is, and arguably should be, very low for the woman, her baby and the caregiver.[1]

In cases where there are clear maternal or fetal indications for either vaginal birth (VB) or caesarean section (CS), the choice of method becomes easy. The woman with a major grade placenta praevia or with a fetus in the transverse lie should clearly have a CS. Most experts would agree that the woman with moderate mitral stenosis should have a VB where possible, with close attention paid to fluid balance, pain relief and a shortened second stage. But what is the safest route for the baby in cases where there is no strong indication for either VB or CS?

Before we begin the discussion, it is important to state that the available data are insufficient to comment with conviction on the question of which mode of birth is safest for neonates of mothers with a low-risk pregnancy. When comparing VB to CS it would be most appropriate to compare pre-labour CS without any medical or obstetric indication to VB, as opposed to comparing VB to all 'elective' CS, which would inevitably include procedures done for maternal and fetal obstetric and medical indications.[2] Ideally, VB after CS should also be excluded from the analysis. Unfortunately, there is a distinct lack of studies comparing low-risk CS by maternal choice to planned VB.[3] Randomised trials of this type would have innumerable methodological hurdles to clear in addition to the minefield of ethical issues. There also appear to be multiple reasons for the dearth of appropriate observational studies, including the fact that elective CS by maternal choice is a relatively new phenomenon, the numbers are relatively low (3% of all deliveries in a 2009 Australian study[4]), there is no coding system for it and record-keeping is poor.[2,3,5] Thus the studies quoted below use all elective CS as a surrogate for low-risk CS by maternal choice versus planned VB.

CS has been associated with deleterious neonatal outcomes, such as increased respiratory morbidity, the possibility of inadvertent iatrogenic prematurity and a reduction in breastfeeding initiation, while also being associated with reduced fetal injury and perinatal morbidity when compared to VB.[2]

It is generally accepted that CS is associated with an increase in respiratory morbidity for the neonate, as well as admission to neonatal intensive care unit (NICU). Observational studies have shown that planned CS leads to an increase in transfer to the NICU (5.2% versus 9.8% P = <0.001)[6] though it is recognised that this may be influenced by the fact that even elective CS births are more likely to be attended by paediatric staff than are uncomplicated VBs.

The rate of respiratory morbidity (including transient tachypnoea of the newborn and respiratory distress syndrome) for CS prior to labour (35.5/1000) is greater than for CS performed during labour (12.2/1000) or for VB (5.3/1000) (OR 6.8, 95% CI 5.2–8.9 P<0.001).[7] Some studies have found that VB leads to an increase in the rate of APGARs <5 after VB,[7] while others have failed to reproduce this finding.[6,9] Of note, the increased risk of respiratory morbidity associated with CS is reduced if birth is delayed until after 39 weeks.[7,10]

There is a reduced rate of breastfeeding at six weeks postpartum among women who gave birth via pre-labour CS. By three and 24 months, this effect has disappeared and the rate of breastfeeding is similar among women who delivered by CS and those who had a VB. Unfortunately, the studies look at all elective CS and compare them with VB, as opposed to looking at low-risk, elective CS by choice versus planned VB. The caesarean groups studied will therefore include those performed for fetal and/or maternal reasons that may explain the delay in breastfeeding initiation, such as maternal intensive care unit (ICU) admission and NICU admission.[13]

Delivery via CS reduces the risk of serious fetal injury by avoiding complications that can occur in any vaginal birth, such as shoulder dystocia, as well as by avoiding the complications that can accompany instrumental delivery.

The incidence of brachial plexus injury after VB is 0.047–0.6 per cent versus 0.0042–0.092 per cent for CS. Using these figures, it is estimated that the number of CS that need to be performed to avoid one permanent brachial plexus injury would be 5000–10 000.[14]

The risk of intracranial injury is reduced in elective CS one in 2750 versus one in 1900 for spontaneous vaginal delivery. However, the risk increases if emergency operative delivery is required. The rates are one in 907 for CS in labour, one in 860 for ventouse delivery and one in 664 for forceps delivery.

Fetal injury does still occur with CS, but the rates are low. The rate of fetal injury with any CS (elective and emergency) is 1.1 per cent and 0.5 per cent for elective CS alone.

The majority of fetal injuries associated with CS are minor, such as superficial skin laceration.[14] The rate of moderate to severe neonatal encephalopathy is 3.8/1000 term live births. Intrapartum hypoxia is the cause in four to 10 per cent of these cases and intrapartum factors superimposed on

antenatal risk factors account for 25 per cent. Babies born by pre-labour elective CS have an 83 per cent lower risk of severe neonatal encephalopathy.[14]

The number of elective CS that would need to be performed in order to prevent one case of cerebral palsy is estimated to be 5000. (This includes cases caused by intrapartum and late antenatal events that may be prevented by CS at 39 weeks.)[14]

It has been argued that a policy of birth by 39 weeks (as generally occurs with elective CS) could lead to a reduction in stillbirth. This is based on US data from 2006 that show an increase in fetal death rate from 1.3/1000 at 37 weeks to 2.9/1000 at 39 weeks, and 4.6/1000 at 42 weeks. Few pregnancies last until 42 weeks these days. In fact, the reduction in Australia would be less as the gestation-specific stillbirth rates are lower than those from the USA. It must also be noted that the same reduction in stillbirth could be achieved by a policy of induction of labour at 39 weeks. A rational approach to early induction, based on risk factors for stillbirth, is likely to have an impact that exceeds other strategies for stillbirth prevention, but this is based on time of birth not method.[14]

A newly recognised and possibly deleterious association with CS is the impact on the neonatal intestinal microbiome. There is evidence that labour and VB allows seeding of the neonatal gastrointestinal (GI) tract with maternal intestinal and vaginal flora, which encourages a favourable microbiome in the child. It appears that CS bypasses this microbial seeding, thus leading to a less-favourable complement of intestinal micro-organisms. The long-term health impacts of this altered intestinal microbiome have not yet been fully elucidated, but there is some indication that it may alter development of the neonatal immune system and susceptibility to disorders ranging from obesity to allergic disorders (for example, asthma) and autoimmune diseases (for example, inflammatory bowel disease and Type 1 diabetes mellitus).[11,12] A recent study has demonstrated that swabbing the vagina prior to CS and then placing the swab covered with maternal vaginal fluids on to the neonate after delivery caused a shift in the neonatal microbiome towards that seen in neonates born vaginally.[15] It is yet to be demonstrated, however, whether this translates into an improvement in the long-term health consequences previously mentioned. This practice, known colloquially as 'seeding' has been the subject of controversy owing to the potential risk of transferring pathogens, such as group B strep, from the vagina and on to the baby.

So, which method of birth is the safest from the perspective of the neonate? An elective procedure is preferable to an emergency CS, and a spontaneous VB is preferable to an instrumental delivery in regards to both maternal and fetal outcomes. As mentioned above, the studies available compare all elective CS to planned VB and are plagued with confounding factors, meaning it is still difficult to say with any degree of authority whether low-risk CS by maternal choice is safer for the fetus than planned VB. A policy of elective CS for all would reduce the rate of late stillbirth but this would be due, in the majority, to the effect of delivery at 39 weeks of gestation, which could also be achieved by a policy of induction of labour at 39 weeks. Elective CS also significantly reduces the risk of neonatal trauma and hypoxic-ischaemic encephalopathy, but the numbers needed to treat are large. On the flipside, CS increases the risk of respiratory morbidity and alters the intestinal microbiome of the neonate. The degree of the former is somewhat reduced if delivery is delayed to after 39 weeks of gestation and the impact of the latter is still to be determined. On balance, it appears that elective CS allows avoidance of rare but severe complications with long-lasting effects, such as fetal trauma, while increasing the risk of short-term respiratory morbidity and reducing the short-, but not the long-term, breastfeeding rate. Where the microbiome sits in the argument is yet to be seen, but may have longer-term consequences. The important thing to remember here is that as obstetricians, we have two concerns – the woman and her baby, and despite the theme of this article, it is impossible for us to look at either of these two in isolation. In reality, it is the balance between risks and benefits for both that is important and needs to be assessed individually for each case. Arguably the most important message to take away from this is that there are risks and benefits to the fetus associated with labour and with elective CS and that our duty as obstetricians is to disclose these risks and benefits and help our patients make the most appropriate decision.

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Unintended harm: pelvic floor trauma

Dr Sylvia Lin
BHB, MBCHB, FRANZCOG, MMedSc
Waikato Hospital, New Zealand

Dr Ixora Kamisan Atan
MD, MOG, Urogynaecology Fellowship
Department of Obstetrics & Gynaecology, Universiti Kebangsaan Malaysia Medical Centre

Since pelvic floor trauma, such as levator ani avulsion, is a possible injury sustained at vaginal delivery and is associated with chronic pelvic floor dysfunction (PFD), should informed consent be routinely obtained in women attempting vaginal birth?

In *O&G Magazine*, Autumn 2014,[1] we reviewed epidemiological evidence (Table 1) on partial protection of caesarean section (CS) on aspects of PFD, especially for pelvic organ prolapse (POP). POP is a particularly significant problem with lifetime risk for surgery of up to 20 per cent and high re-operation rate of up to 30 per cent.[2,3] In the USA, it has been estimated that approximately 200 000 prolapse procedures are performed annually[4] with a direct cost of over US$1 billion.[5] With the ageing population, prevalence of surgery for PFD is likely to increase substantially. The aetiology of PFD is multifactorial and still not well understood, but includes childbirth, changes in collagen metabolism,[6,7] obesity,[8] ageing[9,10] and menopause.[11] Evidence from epidemiological and observational cohort studies suggests that vaginal birth (VB) is the main aetiological factor.[12-15] Levator ani muscle (LAM) injury has been postulated as the missing link between VB and POP.[13,16]

Obstetric demographics have also changed in many ways in recent years, such as increasing BMI and maternal age at first delivery, along with additional factors, such as allowance of long second stage and pressure to lower CS rates as a clinical indicator;[8,12-13,17-20] these may further increase the likelihood of PFD. In the current era of increasing public expectations from birth care providers and evolving information seeking behaviour, birth care providers should be able to impart accurate information to women in constructing their delivery plans.

We recently conducted a 20-year follow up on the Dunedin, New Zealand arm of the collaborative longitudinal study ProLong (PROlapse and incontinence LONG-term research study). While we await data from Birmingham and Aberdeen; on the Dunedin cohort alone, we found significant associations between mode of delivery, evidence of persistent pelvic floor trauma and development of aspects of PFD.[13,21] We will highlight some of our findings to emphasise the urgent need for ongoing research and refinement of risk-predicting tools to better counsel women regarding PFD risks and its prevention.

Pelvic floor trauma at childbirth

Pelvic floor trauma sustained during vaginal childbirth is not limited to the apparent perineal trauma alone. It also includes LAM avulsion, levator hiatal overdistension and obstetric anal sphincter (OASIS) injuries. Damage to the pudendal nerve and endopelvic fascia has also been described.[22] These are associated with long-term morbidities affecting women's quality of life.

During VB, the LAM undergoes tremendous stretch, ranging from 25 per cent to 250 per cent of its original length.[23] It has been shown that skeletal muscle will not stretch to greater than twice its length without tearing.[24] Substantial macro- and microscopic muscular injuries may occur when a skeletal muscle fibre is stretched to more than 1.5 times its original length.[25] It is thus surprising that more than half of women suffer no discernible change in the distensibility or morphological appearance after VB, which may be attributed to hormonal influence.[26] This sudden and excessive stretching of the LAM during VB may result in two forms of LAM injury: LAM avulsion (macrotrauma) or levator hiatal overdistension (microtrauma). LAM avulsion with a reported incidence and prevalence of 14–36 per cent, remains relatively unknown on the labour floor and is frequently not recognised or not clinically apparent at the time of delivery.[14-15, 26] It may result in levator hiatal overdistension in 28 per cent of cases.[27-30] Both forms of LAM injury are associated with POP and its recurrence after a reconstructive surgery.[13,31-33] Apart from PFD in general and POP, LAM injury is also associated sexual dysfunction,[34-38] making its diagnosis essential.

LAM avulsion may be diagnosed clinically by digital palpation at vaginal examination.[39] However, this involves a longer learning curve.[40,41] In the advent of medical imaging, diagnosis of LAM avulsion may be achieved by a translabial pelvic floor ultrasound (PFUS), endovaginal ultrasound and MRI.[24,26] PFUS is the imaging of choice though, as it is more accessible, less costly and more patient friendly.

Obstetric factors and levator trauma

Established risk factors for these traumas include advanced maternal age at first delivery, prolonged second stage of labour, macrosomic infant, episiotomy, major perineal tears and forceps-assisted delivery.[42-45] Elective CS is protective of LAM avulsion. In a series of 157 women on day two to three postpartum PFUS,[46] none of the elective CS group had evidence of LAM avulsion (0/55), compared with 38.5 per cent after spontaneous VB (27/70). Levator abnormalities have been reported in exclusive CS; however, they are rare,

Table 1. ProLong and other epidemiological studies – conclusions to date.

Urinary incontinence	Faecal incontinence	Prolapse	Sexual satisfaction
Proportion of women who experience urinary incontinence increases from about a third soon after delivery to over half 12 years later. Partial protection from delivery by CS exclusively, but prevalence still high. No difference between elective and emergency CS. Protection lost with subsequent VB. Other risk factors for urinary incontinence: • older maternal age at first birth; • having four or more babies; and • higher BMI.	The risk of long-term faecal incontinence is significantly higher after having had one or more forceps deliveries. No increased risk by vacuum extraction. No evidence of a reduced likelihood of long-term faecal incontinence for women who had delivered exclusively by CS.	Stage 2 prolapse 'normal' for parous women. Exclusive CS delivery significantly reduces risk of objectively measured prolapse 12 years after delivery and a reduced risk of symptoms by 20 years. Having a first baby at over 30 years of age increases risk of POP. Second and subsequent babies increase risk of POP. Women having only vaginal deliveries (and, in particular, forceps delivery) have an increased risk of POP surgery.	Minimal effect of mode of delivery on sexual satisfaction. Incontinent women scored worse than continent women for all sexual satisfaction questions.

attributed to inclusion of partial LAM defect or preceding undisclosed vaginal trauma.[46]

Forceps delivery is a main risk factor for LAM avulsion.[24] In a series of 160 primiparous women at nine to 12 months postpartum, a majority of the forceps delivery (66%) sustained identifiable major levator defect on MRI.[29] A prospective observational cohort of 367 nulliparous women who were scanned antenatally and at three to four months postnatally, found similar association with forceps delivery on PFUS (OR 3.83, 95% CI 1.34–10.94).[42] Our Dunedin 20-year result also confirmed this association (Table 2).

Ventouse delivery, on the other hand, does not appear to be a risk factor.[24] Prolonged second stage of labour is associated with LAM avulsion. One study reported women with LAM avulsion have a 78 minutes longer second stage of labour.[29] Another study reported an odds ratio of 2.27 for LAM avulsion with a second stage of less than 110 minutes.[47] Fetal head circumference may be an independent risk factor; when head circumference was greater than 35.5 cm, the odds radio for levator injury increased to 3.34.[47] In contrast, another study found no association between fetal head circumference and levator injuries.[29]

Early evidence suggests epidural analgesia may be protective of levator hiatal overdistension (OR 0.33, 95% CI 0.12–0.88).[42] Increased maternal age at first delivery was found to be associated

Table 2. Dunedin 20-year follow up – mode of delivery and LAM avulsion.[21]

	Levator avulsion (n=29)	
	N (%)	OR (95% CI)
Only spontaneous vaginal delivery (n=94)	12 (13%)	1
Only caesarean delivery (n=17)	0	
Spontaneous vaginal & caesarean delivery (n=19)	3 (16%)	1.28 (0.32–5.06) p=0.724
Any forceps (n=53)	14 (26%)	2.45 (1.04–5.08) p=0.041
Any vacuum (n=8)	0	

with levator injury.[19,24] The role of maternal BMI remains unclear. Shek et al reported a greater risk for levator injury in women with a lower BMI, but the clinical significance may be questionable as BMI was 27.9 versus 30.[27]

LAM avulsion and PFD

Avulsion injury is more common in women with underactive pelvic floor muscle strength (PFMS), found in 53.8 per cent, compared to 16.1 per cent with a normal PFMS, in retrospective series of 352 women on PFUS. A similar finding of significant reduction in Oxford grading was associated with avulsion defects in another retrospective series of 1112 women.[48]

The relationship between urinary incontinence (UI) and levator defects remains controversial. In contrast, the puborectalis component of the LAM seems important in anal continence, likely by maintaining the anorectal angle.[49] LAM avulsion appears to be a risk factor for faecal incontinence, particularly later in life,[50] thus highlighting the importance of an adequately functioning anal sphincter as well as the suprasphincteric mechanism via LAM.

Perhaps the most established is the relationship between LAM avulsion with POP and POP recurrence after surgery.[16,24] LAM appears to double the risk of significant anterior and central compartment prolapse with less effect on the posterior compartment. In a retrospective review of imaging data and examination findings of 781 women at a tertiary urogynaecology centre (mean age 53 years), POP-Q Stage 2 or higher prolapse was found in 150/181 (83%) women with avulsion and in 265/600 (44%) women without avulsion (OR 1.9, 95% CI 1.7–2.1).[16] The size of the defect correlates with the symptoms and signs of prolapse.[51] A case-control study of 151 women with POP and 135 controls with normal support, DeLancey et al found an adjusted OR of 7.3 for those with

major LAM avulsion, but no significant association with minor levator defect.[52] This was further supported by Pilzek et al.[53]

Both short-term operative results and risks of prolapse recurrence (cystocoele), even with mesh use, are worse in women with LAM avulsion.[54] Dietz et al demonstrated an objective recurrence rate (Stage 2+) of 40 per cent,[55] while Weemhoff et al found an overall objective recurrence rate of 51 per cent with average follow up of 31 months after anterior colporrhaphy.[56]

Our Dunedin 20-year follow-up cohort confirmed similar findings of LAM avulsion association with objectively measured clinical POP and sonographically determined pelvic organ descent.[13]

Research on the long-term impact of LAM avulsion on sexual dysfunction is still lacking. Two studies with postpartum follow up in the first year demonstrated worse sexual function outcome in women with LAM avulsion, with fewer of them resuming sexual intercourse within three months postnatally.[34,35]

Prediction, prevention and repair

Prediction of LAM injury is difficult, if not impossible.[27,43] However, it has been shown that it's the first birth that does the damage in regards to LAM avulsion, hiatal overdistension and anal sphincter defects. Subsequent births do not seem to have substantial additional effect.[57-59] Attempts at prevention should be made prior to the first delivery. To this date, no proven prevention strategy has been found. Study on the antenatal use of Epi-No® birth trainer has shown that the device is unlikely to be clinically beneficial in the prevention of intrapartum levator ani, anal sphincter and perineal trauma.[60]

Previous studies have shown that LAM trauma does not heal.[61] A longitudinal study of 488 women found no evidence of regression or healing of changes to levator distensibility.[61] Another prospective longitudinal study showed less common appearance of improvement on scan in women with major LAM injury.[62] Women with persistent LAM injury at one year follow-up reported more bothersome symptoms, reduced PFMS and enlarged hiatus.[62]

Surgical repair of LAM avulsion has been described.[63,64] A prospective surgical pilot study of mesh reinforcement for levator repair at time of concurrent standard prolapse repair has returned high prolapse recurrence rate in 5/17 women at mean follow up of 1.3 years.[64] Stem cell and extracellular scaffolding technology[65] remains a tantalising prospect for future treatment; however, much of this remains in the preclinical research phase and it will likely be many years before mature technology becomes available for clinical application.

It is only a matter of time before the healthcare consumer, medicolegal and professional bodies inevitably converge to demand full antenatal disclosure on the overall risks involved with various delivery modes. Presently we need to actively pursue ongoing research to better understand the long-term functional sequelae, modifiable risk factors and overall burden of these very common pelvic floor injuries. Risk-predicting tools such as the one proposed by UR-CHOICE[66] on long-term PFD may foreseeably become a routine utility in empowering expectant women with information to make informed decisions and best prepare them for the tremendous changes to take place in their life, their body and their family.

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Planned modes of delivery: an economic analysis

Dr Iniyaval Thevathasan
MBBS
Maternal Fetal Medicine Fellow
Royal Women's Hospital, Melbourne

Dr Nicole Woodrow
MBBS, MRCOG, FRANZCOG, DDU, COGU, MBioeth
Royal Women's Hospital, Melbourne

'...Wine maketh merry: but money answereth all things...'

Ecclesiastes 10:19 .

While it may seem uncouth to speak of money when considering healthcare decisions, it is important to note that rational, equitable and efficient allocation of scarce healthcare resources is required to maintain a functional healthcare system.

Caesarean section (CS) rates have been rising in Australia and debate rages over the best method of delivery, with significantly higher rates of CS in the private sector than in the public sector.[1] It is generally considered self-evident that a CS is more expensive than a vaginal birth (VB), with the add-on costs from presumed additional staff input and longer postnatal stays.

However, this simplistic dichotomy between modes of delivery to explain a comparative economic analysis is severely limited by:

- A failure to adopt an intention-to-treat analysis when comparing groups. The need for instrumental VB and emergency CS in complicated vaginal deliveries, with their heightened rates of maternal and neonatal morbidities and costs, must be accounted for in the planned VB inventory.
- Charges for a birth episode need to include all aspects of antenatal care, the maternal and child length of stay, the neonatal intensive care unit (NICU) use, any repeat postpartum attendances to hospital and long-term sequelae, such as pelvic floor disorders and psychological wellbeing.
- A failure to recognise the inconsistent way that 'elective CS' may be defined. It is a heterogeneous group made up of multiple medical indications. Pre-existing obstetric and fetal conditions confound the results. Additionally CS for 'maternal request' have been known to be coded by other indications for insurance and liability concerns.[2]
- Different standards of practice environment for alternative modes of delivery. The risks and benefits to women and their babies will depend on the clinical protocols and expertise on the frontline.

This article aims to review the published evidence for economic differences with regard to mode of delivery for the following three situations:

1. Planned VB compared to planned CS
2. Planned VB versus planned elective CS in term breech presentation
3. Trial of labour (TOL) after CS versus elective repeat CS.

Comparing planned VB to elective CS

Petrou et al published a meta-analysis in 2001, comparing various costs in relation to mode of delivery.[3] They reviewed 49 studies that examined the economic aspects of CS and alternative modes of delivery that contained useful economic cost data in regards to the costs of duration of labour, requirement of staff, costs of equipment as well as the long-term costs. These costs were then converted to UK sterling and inflated to 1998 prices using the National Health Service (NHS) Hospital and Community Health Services Pay and Prices Inflation Index.[4]

Duration of delivery was shortest in the group having spontaneous VB when compared with emergency CS.[3] It was hypothesised that a longer duration of labour would lead to larger costs, owing to overhead running costs and staff costs. However, this was largely dependent on the size of the obstetric service, with smaller obstetric services incurring a relatively larger cost with longer duration of labour compared with large academic centres.[5]

The number of staff – midwifery, nursing and medical – attending an emergency CS compared with a spontaneous VB is larger, though dependent on local practices.[3] Consequently, an almost doubling of staff fees has been reported when comparing spontaneous VB to emergency CS.[6,7]

As women having emergency CS routinely have a longer postnatal stay; unsurprisingly, there is an almost four-fold increase in cost when comparing the postnatal costs of emergency CS to spontaneous VB.[8] The long-term risks of CS are well known, including delayed conception, increased risk of ectopic pregnancy, placental adhesive disorder, postpartum depression and difficulties with breastfeeding.[9-10] However, few studies compare the long-term healthcare costs of women who have had an emergency CS with those who have had a spontaneous VB. Women undergoing an emergency CS were more likely to incur healthcare costs secondary to increased rehospitalisation rates in the first 60 days postpartum,

Table 1. Economic analysis of elective CS versus TOL.[2]

Indication	Analysis of cost effectiveness	Factors determining costs
Maternal request at term	CS and TOL likely to be equal for primary childbirth[19,20]	Long-term parameters related to pelvic floor disorders play an important role in determining cost and quality of life Psychological wellbeing appears related to autonomy for maternal choice not either mode of delivery
Following a previous CS	TOL likely more cost effective	Dependent on probability of successful VB in the institution (needs to be at least 67% to be cost effective)[17] Analyses do not include linking of maternal and neonatal (NICU) hospital records for costing
Singleton breech at term	CS more cost effective[14]	Higher NICU utilisation rates for planned VB was a major cost
HIV-infected women	CS likely more cost effective[21]	Prevention of vertical transmission of the virus. Highly active antiretroviral therapy may decrease the difference[22]
Hep C infected women	TOL likely more cost effective[22]	Dependent on vertical transmission rate[23]

largely secondary to uterine infections, wound complications and venous thromboembolic complications.[11]

Petrou et al asserted in 2013 on an updated meta-analysis that having an 'elective CS' was 1.1–4.1 times the cost of a VB in low-risk pregnancies.[2] Kazandjian et al[12] rejected the assumption that CS is always costlier that VB. The authors linked maternal and child health records to extract economic data with regard to maternal co-morbidities, mode of delivery and transfer to NICU. They concluded that average total charges for VB (maternal plus baby charges including NICU use) were higher than the equivalent CS cohort by ~$US4000 in 2005. The presence of maternal comorbidities (hypertension and diabetes mellitus) was the major economic influence, owing to the higher necessity for a transfer to NICU.

Mode of delivery and breech presentation

The Term Breech Trial, a multicentre, multinational randomised controlled trial comparing planned VB with planned CS, concluded that composite perinatal and neonatal outcome was significantly lower in the planned CS group when compared to the planned VB group in an intention-to-treat analysis.[13] A cost-analysis was undertaken on this data to determine the economic implications of mode of delivery.[14]

The economic analysis was only carried out on cases from countries with low rates of perinatal death (<20/1000) and included Australia, Canada, Chile, Denmark, Finland, Germany, Israel, Netherlands, New Zealand, Poland, Portugal, Romania, Switzerland, the UK, USA and Yugoslovia.[14] The groups were comparable with 515 mothers and 514 infants in the planned caesarean group and 512 mothers and 511 infants in the planned VB group.

Women in the planned VB group had a larger number of antenatal visits, inductions/augmentations of labour, epidural anaesthesia and a longer stay in the antenatal/labour wards. Women in the planned CS group had greater use of spinal anaesthesia, CS and a longer stay on the postnatal ward.[14] Infants in the planned CS group had less NICU time and more normal newborn examinations than those in the planned VB group.[14]

Women in the planned CS group had statistically significantly lower overall costs compared to those in the planned VB (median cost for planned CS $7165 versus median cost for planned VB $8042) largely secondary to increased healthcare worker and hospital fees incurred, as well as higher costs associated with infant stay in NICU.[13] The slightly greater cost of performing an emergency CS in the planned VB group did not majorly contribute to the overall differences in costs.[14]

TOL after CS versus elective repeat CS

Due to rising CS rates, women and clinicians are faced with the decision of trial of labour (TOL) after CS versus an elective repeat caesarean delivery in their subsequent pregnancies.[15] Short- and long-term implications of each mode of delivery have been well documented.[16] The economic implications, however, have not been well explored.

Fawsitt et al performed a 'bottom-up' cost-effectiveness analysis, employing a decision analytic model comparing outcomes of TOL after CS with elective caesarean delivery in a hypothetical cohort of 10 000 low-risk women using outcome data from Ireland and the USA.[17] They concluded that the lowest costs were associated with a successful VBAC and that the highest costs were associated with an emergency CS following TOL, due to extended duration of labour and the necessity for the presence of specialised medical staff at delivery. Overall, the study concluded that TOL was more cost effective than elective CS, despite a small increase in maternal morbidity in the TOL group, when the probability of success was greater than 67 per cent.[17] Significant limitations to this study included its hypothetical nature, as well as the inability of the study to consider long-term maternal and fetal outcomes.

Further hypothetical cost-effectiveness analyses have confirmed the aforementioned findings;[18] however, there is a need for prospective trials to further determine the cost effectiveness of TOL versus elective CS.

Conclusion

The economic differences related to mode of delivery remain specific to clinical circumstances. There remains scarce evidence comparing the costs of planned VB with planned CS. For women attempting a spontaneous VB, an emergency CS is likely to be the greatest economic burden for their care. On hypothetical data, this is also the case for low-risk women attempting a TOL after CS. In women with breech presentation at term, the economics clearly favour an elective CS over an attempted VB.

Money may 'answereth all things' but only when supported by robust, prospective evidence. Costs of healthcare remain difficult

to define, due to the inability to measure intangible costs and the long-term outcomes associated with healthcare decisions. There is a paucity of economic knowledge with regard to the cost-effectiveness of mode of delivery. Future directions need to include consistent coding of elective CS by indication and the linkage of maternity costs to any ensuing neonatal care costs.

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Mental health after unexpected birth outcomes

Dr Brett Daniels
PhD, MBBS, FRANZCOG

What constitutes a good birth? For an obstetrician, the health of the mother and baby is paramount and, in many cases, we may be comfortable accepting a more interventional approach if it becomes necessary. For many women, however, the balance may be different, as giving birth child is an event overlaid with cultural and personal desires; one study reports that seven per cent of women perceived their birth experience as negative.[1] There is no single preferred birth plan that will satisfy all women, and nothing can absolutely protect against a feeling of disappointment if things do not go as planned. An unexpected or traumatic birth experience can lead to long-term issues for women and it is important to recognise this potential and to offer assistance where possible.

Birth trauma

It is recognised that, in the postnatal period, one to two per cent of women experience symptoms satisfying the criteria of post-traumatic stress disorder (PTSD).[2]

As defined in the American Psychiatric Association *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*,[3] for a person to satisfy a diagnosis of PTSD, they must meet a number of criteria:

1. That the person was exposed to actual or threatened death, serious injury or sexual violation. This may be either:
   - Directly experiencing the traumatic event(s)
   - Witnessing, in person, the event(s) as it occurred to others
   - Learning that the traumatic event(s) occurred to a close family member or friend
   - Experiencing repeated or extreme exposure to aversive details of the traumatic event; this does not apply to exposure through media such as television, movies, or pictures, but can include workers involved in caring for such events.
2. The persistent re-experiencing of the event including:
   - Thoughts or perceptions
   - Images
   - Dreams
   - Illusions or hallucinations
   - Dissociative flashback episodes
   - Intense psychological distress or reactivity to cues that symbolise some aspect of the event.
3. The avoidance of stimuli that are associated with the trauma and numbing of general responsiveness, as determined by the presence of one or both of the following:
   - Avoidance of thoughts, feelings, or conversations associated with the event
   - Avoidance of people, places, or activities that may trigger recollections of the event.
4. Symptoms of negative alterations in cognitions and mood associated with the traumatic event(s):
   - Inability to remember an important aspect of the event(s)
   - Persistent and exaggerated negative beliefs about oneself, others, or the world
   - Persistent, distorted cognitions about the cause or consequences of the event(s)
   - Persistent negative emotional state
   - Markedly diminished interest or participation in significant activities
   - Feelings of detachment or estrangement from others
   - Persistent inability to experience positive emotions.
5. Marked alterations in arousal and reactivity including:
   - Irritable behavior and angry outbursts
   - Reckless or self-destructive behaviour
   - Hypervigilance
   - Exaggerated startle response
   - Concentration problems
   - Sleep disturbance.[3,4]

While for most women childbirth is not traumatic, for many women uncertainty, pain and a genuine fear for the wellbeing of themselves and their baby mean that childbirth has the potential to result in PTSD.

A 2012 review by Andersen et al listed a large number of criteria associated with a higher possibility of PTSD after childbirth. They classified them into top-, intermediate- and bottom-rated predictors.[2] Top-rated factors were subjective distress in labour, including loss of control, obstetric emergencies, emergency caesarean section, instrumental delivery or pain. Intermediate predictors included infant complications, including preterm birth, maternal mental difficulties both before and during pregnancy, maternal prepartum or intrapartum medical complications, a previous history of trauma or sexual abuse, and a lack of support from staff or their partner. Factors that were not associated with a risk of postnatal PTSD symptoms included duration of labour, perineal tearing, parity and whether the pregnancy was planned.[2] The authors hypothesised that a mechanism for the development of PTSD after childbirth included three factors:

1. A predisposing psychological disposition in the individual
2. A traumatising event in childbirth
3. The perception of this event being traumatic.

They then conclude that perceived support was also of great importance and provides an opportunity for reducing the risk of PTSD.[2]

It is important to note that these are only predictive factors. Unfortunately, the absence of these factors is not completely protective against the development of PTSD after childbirth, as some women without any risk factors experience psychological trauma after an uncomplicated vaginal birth.[5]

Reducing the psychological distress of childbirth

The idea that childbirth, particularly with an unexpected outcome, can have adverse psychological effects on women will not be surprising to clinicians looking after women during and after pregnancy. In addition to the women experiencing clinical PTSD, there are a greater number of women who will live with negative perceptions of their birth experience that may affect their future reproductive choices. There are a number of techniques that may be employed to reduce this possibility in women and their partners.

Antenatal care

Anderson et al identified loss of control, fear and pain as top-rated factors associated with the development of postnatal PTSD symptoms.[2] To some extent, these can be related to the rapid introduction of new and unfamiliar interventions and possibilities during labour when women are already stressed and in pain. There is an opportunity antenatally to educate women about the possibilities of unexpected changes in their birth plans and to allow them to discuss their fears and perceptions of the range of obstetric possibilities. This can be done during antenatal classes or in individual sessions with obstetricians or midwives.

In addition to basic education, the antenatal period provides a time for women, their partners and their carers, to discuss their personal beliefs and expectations regarding their birth and to find some common ground. In most cases women and their carers will hold similar desires for their labour care, but in some cases these expectations will be very different. It will be less traumatic if these differences can be explored prior to labour and a mutually acceptable plan can be made between the woman and her caregivers. If the differences between their plans are too great, then both the patient and carer have time to make alternative arrangements before birth.

Intrapartum care

While obstetric emergencies, emergency caesarean and instrumental deliveries cannot always be avoided, there are intrapartum factors that could be used to reduce the traumatic effect of an unexpected outcome. The feelings of loss of control and perceived lack of support during labour are highly associated with psychological distress. Unfortunately, both of these feelings can easily be exacerbated in an emergency situation where staff concentrate on technical roles to expedite delivery or provide emergency care, and where the birth partner may also be unable to provide meaningful support due to their own distress.

In many situations, it may be that there is some time in which an event such as emergency caesarean or instrumental delivery declares itself as a possibility and it is desirable that the woman and her partner are aware of this possibility and included in the decision, rather than keeping information from them until a sudden change of birth plan is made. An atmosphere of rush and panic will only increase everyone's levels of anxiety and reduce performance. In any emergency situation it is important that someone is calm, at birth it is helpful if that person is the obstetrician.

Postpartum care

Following a traumatic or unexpected birth outcome, we have the opportunity to reduce, identify and treat women experiencing adverse psychological events. As stated above, a feeling of support will help to reduce the development of PTSD symptoms. Women should be offered the opportunity to openly discuss their birth and the feelings arising from it both soon after the birth and later if desired. Their obstetrician, midwife, GP or other professional is well placed to offer this support. How this open discussion is best achieved is unclear. A 2015 Cochrane review on the effectiveness of formal psychological debriefing methods on the development of PTSD symptoms following traumatic childbirth found no systematic differences between standard postnatal care and formal debriefing at up to 12 months postpartum.[5]

The identification and treatment of women who develop PTSD following childbirth is beyond the scope of this article. In many cases the symptoms of PTSD listed above can be appreciated by people providing postpartum care with an appropriate level of clinical awareness of the patient's individual situation. If PTSD is diagnosed, treatment will depend on local factors. In general, however, referral to a psychiatrist or psychologist with an interest in perinatal mental health or trauma is likely to be appropriate.

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Morbidly adherent placenta: planning for hysterectomy

Dr Anthia Rallis
FRANZCOG
Visiting Medical Officer
Women's and Children's Hospital, South Australia

It was not long ago, and certainly prior to the use of ultrasound in pregnancy, that the diagnosis of morbidly adherent placenta was a clinical finding at the time of delivery of the placenta. Adherence of the placenta to the uterine wall carries significant risk of mortality and morbidity to the mother, with emergency caesarean hysterectomy and massive transfusion often being required. The development of high-resolution and Doppler ultrasound as well as adjunctive magnetic resonance imaging (MRI) in pregnancy, has made it possible to diagnose these conditions in up to a half of cases[1,2] prior to delivery, and plan for the potential life-threatening complications that it poses.

A number of studies show blood loss and transfusion are significantly lower in women with antenatal diagnosis of abnormally adherent placenta,[2,3] mostly because these women are more likely to have preventative therapies for haemorrhage. Several other studies report that planned peripartum hysterectomy also results in less red cell and platelet transfusions,[4] as well as less overall blood loss, lower overall complication rates and fewer intensive care unit (ICU) admissions.[5]

The incidence of placenta accreta has significantly increased, owing to the increasing number of caesareans sections (CS) over time. The Australian average is currently reported as 32.4 per cent,[6] and the consequences of repeated CS are well documented. In 2006, Silver et al famously reported chances of accreta to be 2.4 times higher after three CS and 8.8 times higher after four CS, compared with one.[7] In 2012, the fertility rate in Australia was 1.93 children per woman. This may be thought to offset the rates of accreta mentioned above; however, the condition is still more likely after one CS when compared to a first vaginal delivery and we should suspect it in women with a previous CS, or other uterine surgery, particularly if they have a placenta praevia or increased maternal age.[2,4,8]

Routine ultrasound at 20 weeks can identify a low-lying placenta or major grade placenta praevia and these women should be followed up with an ultrasound at 32 weeks for placental localisation. Detailed ultrasound interrogation should certainly be performed in the setting of an anterior low placenta in a woman with previous uterine surgery or CS, as the ultrasound findings provide 100 per cent sensitivity. Because the specificity of ultrasound is lower (around 40%), diagnosis and surgical planning can be aided with the additional use of MRI.

However, evidence does not support the use of MRI as superior to ultrasound at this stage.[3,9,10]

Once abnormally adherent placenta is suspected or confirmed, detailed consideration needs to be given to the delivery, including a planned hysterectomy at the time, as best evidence suggests outcomes are improved in this way. This option may not be acceptable to women requiring future fertility and for those women, leaving the placenta in place is an option. This requires discerning postoperative management, as up to 80 per cent (in some series) experience secondary hysterectomy and/or other morbidity.[2,11,12]

On a day-to-day level, the general obstetrician may consider how they would approach such cases in their own environment, especially if their hospital does not contain a Level 3 adult intensive care unit (ICU) or access to a multidisciplinary team. In the situation where an abnormally adherent placenta is confirmed or is highly suspicious antenatally, a referral to a suitable centre is recommended. When diagnosis of adherent placenta occurs at delivery, which may occur for up to half of placenta accretas diagnosed, the 'care bundle' developed by the Royal College of Obstetricians and Gynaecologists,[13] is useful. Developed as a response to the findings of the confidential enquiry into maternal deaths,[14] the guideline was designed to improve the outcomes associated with placenta praevia/accreta. The approach has been shown to be achievable and practical in a pilot study and suggests the following six practice points be applied in all cases where there is a placenta praevia and a previous CS, or an anterior placenta over-lying the old caesarean scar:

- Consultant obstetrician planned and directly supervising delivery
- Consultant anaesthetist planned and directly supervising anaesthetic at delivery
- Blood and blood products available
- Multidisciplinary involvement in pre-operative planning
- Discussion and consent, including possible interventions (such as hysterectomy, leaving the placenta in place, cell salvage and interventional radiology)
- Local availability of a Level 2 critical care (ICU) bed.

Further suggestions from the guideline are that women declining blood products be transferred to a centre where cell salvage

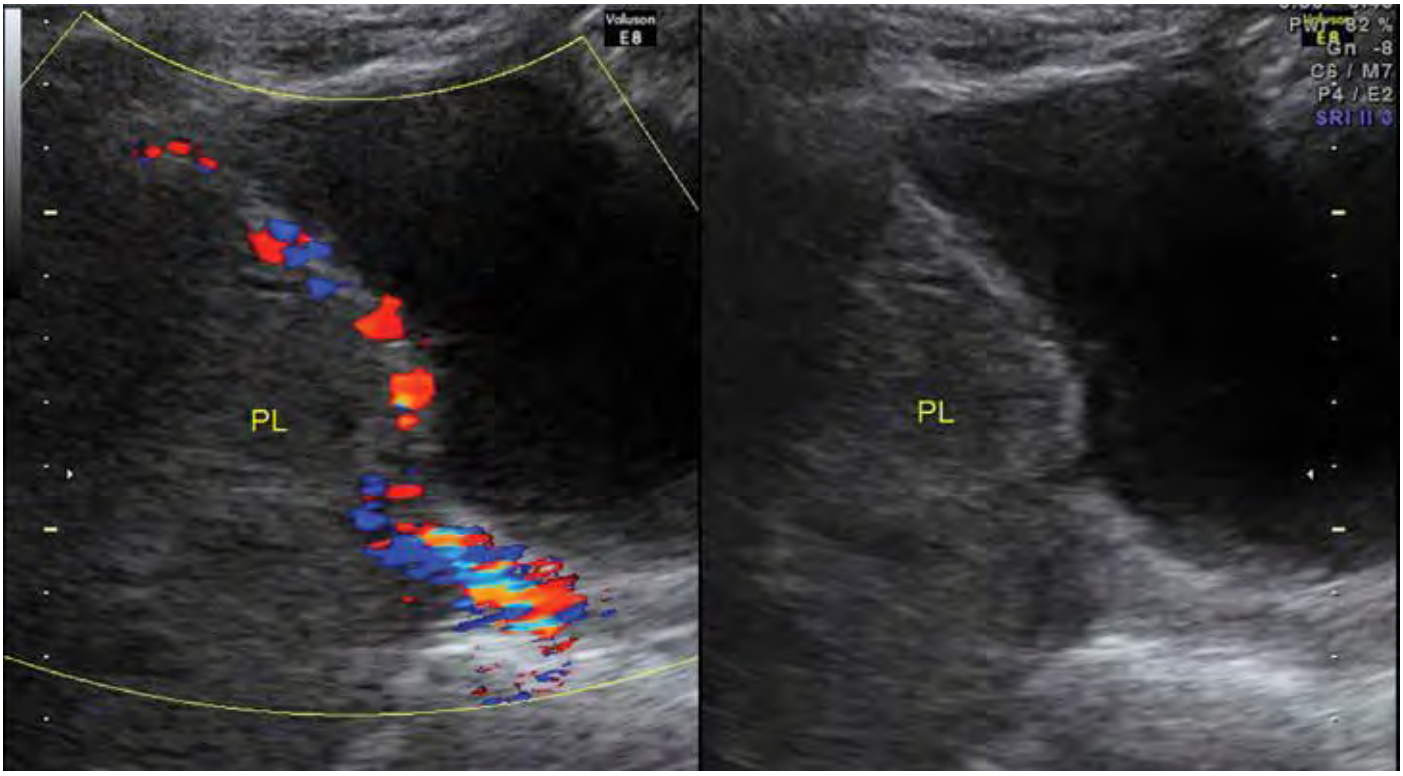

Figure 1. Placenta percreta suspected on ultrasound.

and interventional radiology are available. Confirming availability of a Level 2 ICU before commencement of the procedure is also recommended.

In a centre with access to Level 3 ICU and a multidisciplinary team, a more integrated approach can be taken and will lead to improved outcomes.[15] The team will include obstetricians, gynaecologists or gynae-oncologists, anaesthetists, midwives, neonatologists and possibly all, or some, of the following: haematologists, urologists, interventional radiologists and vascular surgeons. It is important to organise appropriate access to theatre with adequate time allocation for the case. Postoperative recovery in a high dependency unit (HDU) or ICU should be booked and available. Blood products should be matched and available (including consideration of alternatives in the setting of patients who refuse blood products) and cell salvage should be available where possible.

Presurgical planning is best to include:

- Anaesthetic review, in particular the anaesthetic type – spinal, combined spinal epidural (CSE) or general anaesthetic (GA)
- Patient consent with clear documentation of risks
  - Pain of recovery
  - Wound infection
  - Bleeding and haemorrhage
    - Transfusion of blood and blood products
    - Sheehan's Syndrome
  - Trauma to bladder, ureters, bowel or baby
  - Deep vein thrombosis and pulmonary embolus
  - Prolonged hospitalisation
  - Anaemia
  - Delayed lactation
- Optimisation of maternal haemoglobin and iron stores
- Intramuscular betamethasone for fetal lung maturation
- Surgical plan for the delivery and hysterectomy
  - Skin incision; lower versus midline depending on location of placenta
  - Uterine incision; vertical uterine incision (classical) or high transverse uterine incision to avoid entry into placenta. Relevant imaging and a portable ultrasound machine in theatre may be useful for this
  - Total or sub-total hysterectomy
- Postoperative venous thromboembolism thromboprophylaxis.

Morbidly adherent placenta will continue to be a significant risk for all women with a previous caesarean section, especially in the presence of placenta praevia and for those of increased maternal age. It carries a significant risk of morbidity and mortality to the mother and is ideally managed in a tertiary centre with access to a multidisciplinary team and Level 3 ICU. There are, however, significant elements of planning that can be performed by obstetricians and gynaecologists in other settings, to minimise poor outcomes.

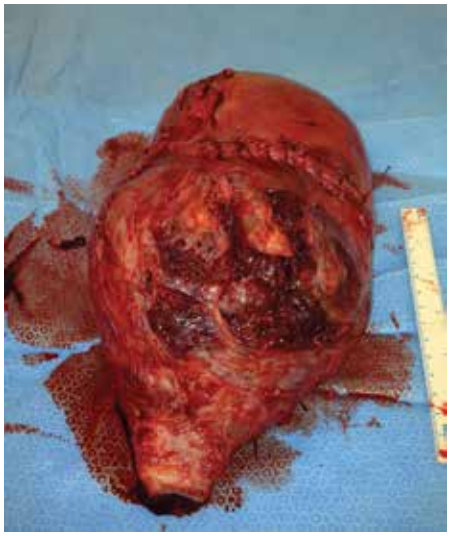

Figure 2. Hysterectomy for percreta.

Figure 3. Patient information videos, available on the College website, can help with the patient consent process.

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Emergency peripartum hysterectomy

Dr Rebecca Mackenzie-Proctor
RANZCOG trainee
National Women's Auckland City Hospital

Dr Mahesh Harilall
Consultant Obstetrician and Gynaecologist
National Women's Auckland City Hospital

The decision to perform an emergency peripartum caesarean hysterectomy is a critical one for any obstetrician. With the rising caesarean section rate, this is a situation we face more often in the future.

The first successful caesarean hysterectomy was described in 1876, by Dr Eduardo Porro of Milan, Italy.

Incidence and cause

Emergency peripartum hysterectomy (EPH) is defined as a hysterectomy performed immediately following, or within 24 hours of, delivery. The reported incidence in developed countries ranges from 0.2 to five per 1000 deliveries.[1, 2]

The Royal Hospital for Women, Sydney, reported an incidence of 0.85 per 1000 births. More recently, the Royal Brisbane and Women's Hospital reported 15 years of data with an incidence of 0.6 per 1000 births.[1] The National Women's Hospital, Auckland, reported a similar incidence of 0.87 per 1000 births in 2015.[3] In a New Zealand study in 2011, 95 per cent of EPHs were following caesarean delivery.[4]

The most common causative factors are:

- Abnormal placentation (morbidly adherent placenta 55%, and placenta praevia 20%)
- Uterine atony[5]
- Uterine scar rupture.

Risk factors

Over the past 20 years, the risk-factor profile for EPH has changed. There has been a shift in risk-factor profile, with atony and uterine rupture no longer the most common causes, those now being superseded by abnormal placentation, which is mainly related to prior caesarean section.[1,5]

In a 10-year data series of EPH from Sydney's Royal Hospital for Women in 2011, 31 cases were reported; 54.8 per cent were due to abnormal placentation, 12.9 per cent due to uterine atony and 6.5 per cent due to uterine rupture.[4]

Placenta praevia is associated with an approximately five per cent risk of hysterectomy, usually in association with placenta accreta. Frequency of abnormal placentation increases with number of previous caesarian births and advanced maternal age.

Caesarean delivery and previous uterine surgery appear to be key risk factors for EPH. Knight et al quotes risk of EPH lowest in women undergoing a first delivery that was vaginal (1:30 000); and highest in women with two or more prior caesarean births (1:220).[2] Silver et al quotes a risk of EPH of one per cent following first, second or third caesareans; two to four per cent following fourth or fifth procedures; and nine per cent for six or more caesareans.[6]

Other risk factors include advanced maternal age, multiparity, multiple gestation, gestational diabetes, infection, and previous uterine surgery.[5,7] More recent papers have also found a link between assisted reproductive treatment as a risk factor independent of the mode of delivery.[8]

Indications and prevention measures

The main indication for EPH is massive obstetric haemorrhage that is unresponsive to conservative measures. Postpartum haemorrhage (PPH) is defined as blood loss greater than 500 mL at vaginal delivery and 1000 mL at caesarean.[9] Rapid management of PPH is an essential skill that all obstetric teams require to reduce risk of an EPH.

It is important that placental location is carefully evaluated antenatally in women with a history of prior caesarean birth. Those with a suspected adherent placenta on ultrasound scan should be referred for further imaging, such as MRI.

Referral to a tertiary centre is recommended. These cases require a multidisciplinary review and planned prelabour delivery with obstetric, anaesthesia, interventional radiology, urology, and vascular/gynaeoncological surgical team involvement.

Basic PPH management is outlined in Figure 1.

If hysterectomy appears inevitable, prompt procedure results in lower transfusion rates and less overall morbidity.[2]

Procedure should be undertaken without delay for cases of:[10]

- Bleeding refractory to conservative measures
- Suspected accreta
- Uterine rupture.

Direct aortic compression can be used as a temporary measure to allow time for resuscitation to catch up and appropriate senior surgical support to be available.

The decision to perform an EPH should be made by a senior clinician and preferably after discussion with a second senior consultant.[7]

Procedure[16]

- Skin incision – both midline and low transverse can be used. Midline incision preferred
- Avoid the placenta; if there is a known praevia and accreta, consider a classical uterotomy incision
- Close uterotomy incision following delivery. Adherent placentas should be left in situ
- Careful bladder dissection off anterior lower uterine segment
  - Sharp dissection should be performed to minimize bladder injury and bleeding. Aim 1–2 cm below the cervico-vaginal junction
  - Understand ureteric anatomy
- Round ligament identification, double clamped laterally
- Utero-ovarian ligament. Special care is needed as vessels are often dilated and tissues can tear easily. Ovaries almost always preserved
- Identify the uterine vessels. Three clamps can be used for extra security, two on the active vessel side and one on the uterine side
- Supra-cervical (subtotal) hysterectomy can be performed at this stage.
- Cardinal ligaments. Clamp, cut and ligate in 1–1.5 cm tissue sections until the external os is reached. Continuous careful inspection of bladder and ureters
- Clamp across vaginal angle and uterosacral ligament, enter vaginal mucosae anteriorly, just below cervix and remove uterus. Secure vaginal vault angles and cardinal ligaments
- There are no specific guidelines for closure of vaginal vault. Continuous or interrupted sutures
- Consider perioperative thromboprophylaxis and antibiotic cover
- Haemostatic agents should be considered if required. Agents such as FloSeal, Fibrillar, Surgicel may be effective; however, none replace meticulous surgical technique
- Subtotal hysterectomy is thought to be faster, associated with less blood loss, less bladder/ureteric injury and is often the procedure of choice in haemodynamically unstable patients[16]
- Total hysterectomy should be considered to reduce problems associated with the residual cervical stump, especially if there is cervical bleeding or an accreta extending on to the cervix
- A retrospective cohort study of 163 EPHs found no difference in total operating time, estimated blood loss, units of blood transfused, preoperative and postoperative haemoglobin when comparing total versus subtotal hysterectomy.[18]

Communication – ensure a multidisciplinary approach

Resuscitation measures

Circulation management
- Massive transfussion protocol should be activated
- Warmed IV fluids should be given
- RCOG recommends 3.5 L clear fluids as maximum
- RBC given early to restore oxygen carrying capacity[11]
- Timeous reversal of coagulopathy is associated with a reduced mortality, and fresh frozen plasma to RBC ratios recommended[11]

Monitoring – vital signs, uring output, clinical response
- Check blood count, clotting factors, lactate

Investigation – identify and manage specfific causes
- 4 Ts: Tone, Trauma, Tissue, Thrombin
- 5th T: Think early about moving to Theatre

Arrest bleeding
- Fundal massage, uterotonics, perineal repair, removing retained products of conception

Interventions to consider prior to hysterectomy
- Intrauterine: Bakri balloon
  - Placement of fluid-filled balloon within uterine cavity shown to significantly decrease need for EPH[12]
- Extrauterine: B-Lynch suture
  - Suture is placed to envelop and compress uterus; used in cases of atony at caesarean
  - Although it preserves fertility, recent studies show an association with increased risk of placentation-related adverse outcomes in subsequent pregnancy[13]

Vascular approach
- Internal iliac artery ligation or uterine artery embolisation
- Aortic balloon catheter

Other pharmacological intervertions to consider
- Tranexamic acid has been shown to reduce blood loss and need for transfusion in women following CS. Data on thromboembolic risk is still lacking.[14]
- Recombinant factor VIIa: recent RCT using rFV11a reported reduction in blood loss, transfusion and need for interventional radiology.[15] Research in NZ and Australia is underway regarding vlaue of rFVIIa for use in PPH.

Figure 1. Basic PPH management includes (simultaneously).[10]

Undertaking an EPH is more complicated than a standard hysterectomy for the following reasons:

- Distended soft cervix – difficult to identify the internal os
- Engorged and dilated pelvic blood vessels – increase risk of bleeding
- Friable and oedematous tissue – increase bleeding
- Large bulky uterus – obscure operating field
- Potentially unstable patient.

Consequences and outcomes

EPH has multiple consequences, affecting women physically and emotionally, as well as affecting the economy. The mortality and morbidity associated with EPH can be due to either the surgical procedure itself, or from the effect of the primary massive obstetric haemorrhage.

Worldwide mortality rates have been reported ranging from two to 15 per cent, with higher rates in developing countries.[1,3-5]

Morbidity is associated with prolonged hospital stay, ICU/HDU admission, increased surgical complications such as ureteric injury (6% to 15%), coagulopathy, massive transfusion, sub-fertility, emotional response and need for psychological support.[18]

Latest research

Research is scarce regarding EPH as is it a rare event. Most literature surrounding the topic are case studies or 10–20 year reports on incidence, epidemiology and management. Interestingly, in 2014, De Miguel et al published a report of 23 EPHs analysing the pathology of the placental site. They found that one-third of EPHs performed during a 10-year period were associated with placental site anomalies originating in the implantation site intermediate trophoblast.[19]

Conclusion

Massive obstetric haemorrhage requiring EPH is an uncommon, but serious, complication of childbirth, carrying significant morbidity and mortality. Prevention, rapid identification and active management of bleeding at, or following, delivery is essential to reduce the need to perform this procedure. With abnormal placentation increasingly becoming the major risk factor for EPH, it is important to address the increasing caesarean section rate.

Tips for a safe emergency peripartum hysterectomy

- Communication and multidisciplinary teamwork is key
- Departmental simulated drills for PPH management
- Massive transfusion protocol
- If placenta is adherent, do not try to remove
- Understand anatomy of ureters, bladder and pelvic vessels

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Mode of delivery: my choice

Anonymous
Advanced FRANZCOG trainee

I am an advanced trainee with RANZCOG; now part way through my fifth year of training. I was lucky enough to have my first baby in June of this year.

My decision in regards to whether to try for a vaginal birth or to opt for an elective caesarean was a difficult one, and I changed my mind numerous times during the course of my pregnancy.

Firstly, I should say that I am a healthy woman in her mid-30s who had a low-risk pregnancy with no complications other than a baby who was large for gestational age (LGA) over serial ultrasound scans.

I was initially set on the idea of an elective caesarean. I am naturally risk averse and liked the element of control that an elective caesarean lends. I had spent the last two years doing tertiary obstetrics and had been exposed to many a labour horror story. I remember being around 26 weeks, sitting in handover and hearing about a woman who had been transferred to our hospital postpartum after having a Kiellands forceps delivery, fourth-degree tear and a baby with intracerebral haemorrhages in the NICU on ventilation. I looked at my colleagues in horror as they attempted to allay my fears with comforting looks and mutterings of 'That will never happen to you.' I knew all too well it could. Labour can be a bitch and she does not discriminate.

To add to my aversion at the prospect of labour, I was doing a urogynaecology term during my mid-pregnancy. Seeing woman after woman with urinary incontinence and/or pelvic organ prolapse did not enhance my faith in the idea of a vaginal delivery. I quite like my sphincters intact; all of them. I don't want my levator avulsed and the prospect of having a procidentia in later life certainly does not appeal.

Despite all this, by the time the third trimester came around and I was waddling to and from the birth suite, something changed. I started to think I would attempt a vaginal birth. I knew all the things that could go wrong, especially with a baby who is LGA, but I also knew that for the majority of women, things go well or only minor complications occur. I was reluctant to commit myself to the recovery and pain involved with having a laparotomy, as well as possible complications if I were to need abdominal surgery in the future. I had a discussion with my obstetrician whom I trust completely. I told her that I wanted to try for a vaginal birth, but that I wasn't interested in any heroics. If she thought things were heading towards an emergency caesarean, I wanted that call to be made sooner rather later, before the risk of complications increased. I had three big fears in regards to vaginal birth:

1. A second stage caesar
2. A forceps delivery (mostly because of its association with my third fear)
3. A third or fourth degree sphincter tear.

I knew we couldn't guarantee avoiding these, but I felt that if we had a low threshold to revert to caesarean delivery, the risk would be minimised.

Photo ©M-SUR, Shutterstock 466029773

Collaborative care takes on new meaning when a doctor becomes the patient. (Photo taken during the Sim Wars session at the RANZCOG 2016 ASM.)

As it happens, I had what was later described by a friend of mine as 'the Ferrari of labours' – luxurious and fast! I was induced at 38+5 for an LGA fetus. I had six hours of syntocinon, an epidural after three hours and, after only 17 minutes of pushing, I had a vaginal delivery with a beautiful baby boy with Apgars of 9 and 9 and only a first degree tear to show for it all (other than the aforementioned beautiful baby boy)!

The decision as to whether to attempt labour or have an elective caesarean section is an extremely personal one and is undoubtedly influenced by our level of knowledge of the risks and benefits of each mode of delivery as well as by our experiences and personal biases.

There is obviously no wrong answer to the question of 'caesarean section or vaginal delivery?' as long each woman is adequately informed of the risks and benefits of each in her particular situation. Prof Dietz and Dr Woodrow wrote an article in the Consent issue of this magazine in which they discussed that we, as obstetricians, have a duty to disclose the risks of vaginal birth with pregnant women just as we would discuss the risk of caesarean section during the consent process. This is an approach I strongly support. Each woman has her own threshold for the degree of risk with which she feels comfortable, as well as her own ideas about what is important during the birthing process. The most important thing we can do as obstetricians to assist a woman in this decision-making process is to educate her about the real risks of both options and support her in her decision as much as possible.

Without the knowledge that both caesarean delivery and vaginal birth can be dangerous, my decision would have been easy, but based on false assumptions. There were obvious risks to the course of action I took. There was no way to guarantee that I wouldn't have significant soft tissue damage, that I wouldn't have ended up with a complicated second-stage caesarean and who knows, I may still end up with a pelvic organ prolapse in the future. The important factor here is that I knew all these complications were possible when I made my decision about the way I wanted to deliver my baby and I therefore took, and continue to take, ownership of those potential complications.

Another important aspect of my antenatal and intrapartum care was the element of control I felt I had. Knowing my obstetrician and having discussed with her my fears and the way I wanted to proceed if things were not going well helped me to feel safe during the entire process. Not all patients will have the capacity nor the inclination to go through the possible scenarios that may occur during labour and what the management options would be, but the idea of open communication was vital for me as I'm sure it is for all women.

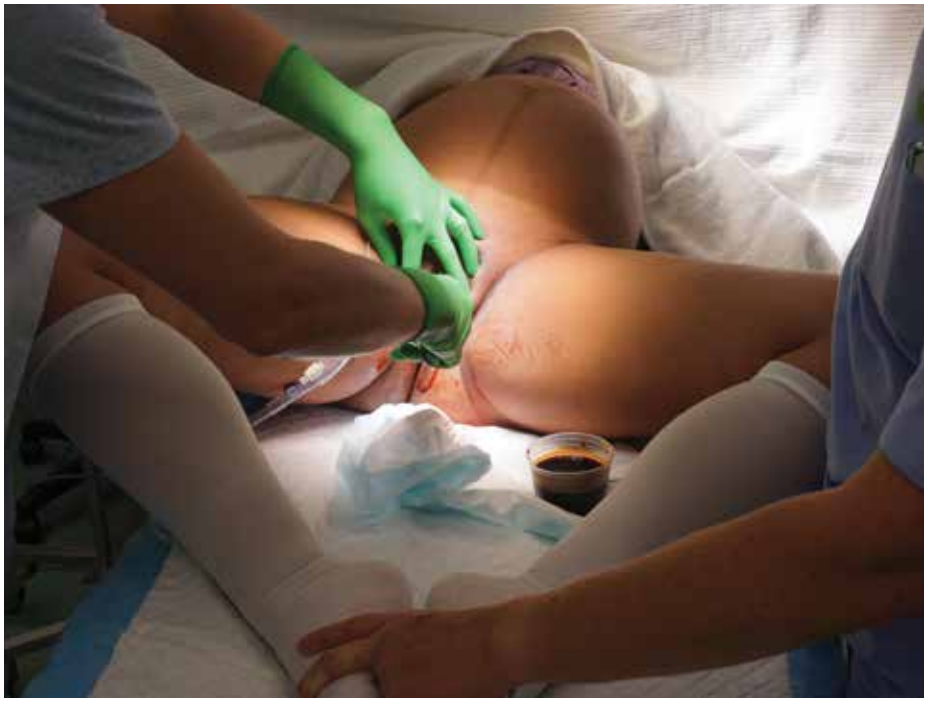
Open and honest communication should always be something we strive to achieve with our patients, but since going through labour myself and understanding what a difference it makes to the experience, I will make even more of an effort to ensure that women and their loved ones understand what is happening during their labour, are involved in the decision-making process and, importantly, have their fears heard.

They say knowledge is power and I certainly felt more empowered in this decision than many women do. Perhaps it is time to empower all our patients to ensure they have as much input into the very personal decision of the mode of delivery of their babies as they do over other areas of their healthcare.

Caesarean section: step by step

Dr Frances Hills
MBBS
FRANZCOG Advanced Trainee
Nambour Hospital

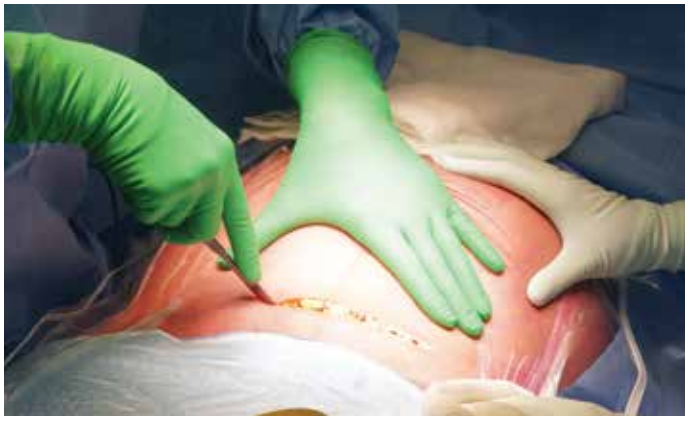
Special thanks to the women at Nambour Hospital who were happy for these photographs to be taken during their caesarean section, and to the staff involved.



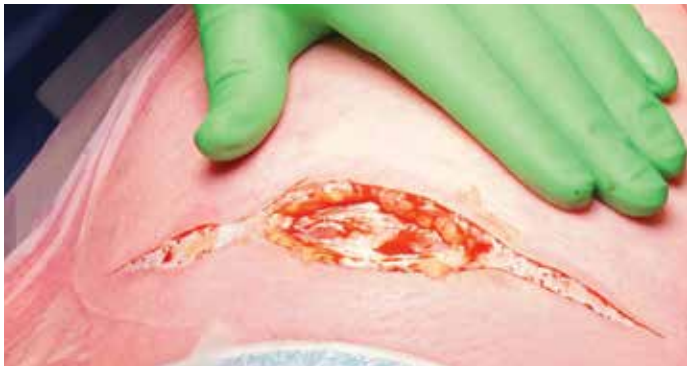
1. Preoperative steps: this patient was undergoing an emergency CS. In this instance it is now our practice to prep the vagina with iodine solution. An IDC was already in situ as the patient had an epidural in labour. TED stockings have been placed on the patient for VTE prophylaxis.

2. IV antibiotics: currently the Therapeutic Guidelines recommend 2 g IV Cephazolin as routine prophylaxis 15–60 minutes prior to skin incision.

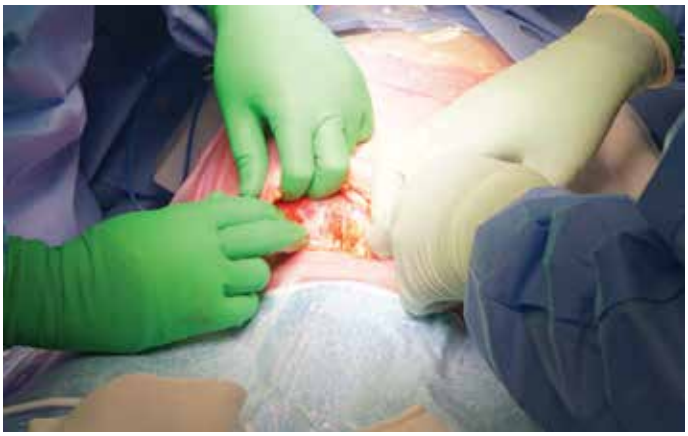
3. Skin preparation with chlorhexidine-alcohol prep, which should be allowed to dry prior to draping. It is important that solution does dry and doesn't pool underneath the drapes, as this is a fire risk and patient burns have occurred previously.



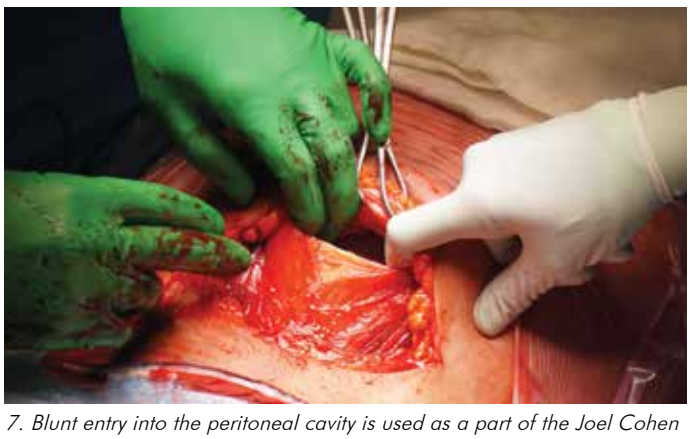
4. Skin incision: the Joel Cohen technique involves making a straight incision 3 cm below the level of the anterior superior iliac spines.



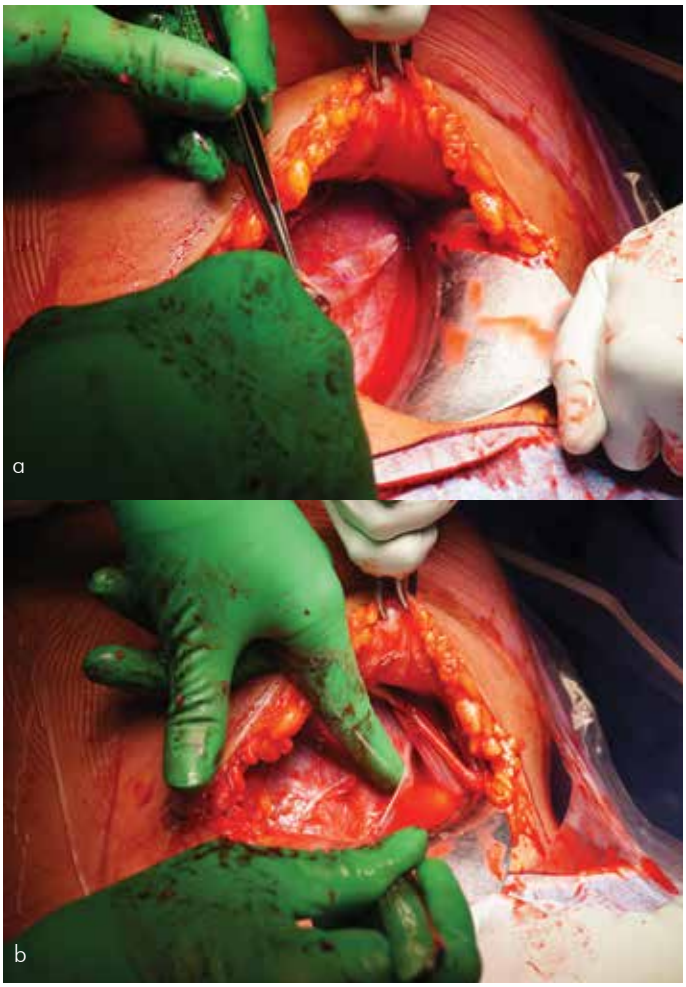
5. Entry technique: sharp entry through the skin, middle 3 cm of the subcutaneous fat and rectus sheath is demonstrated here.



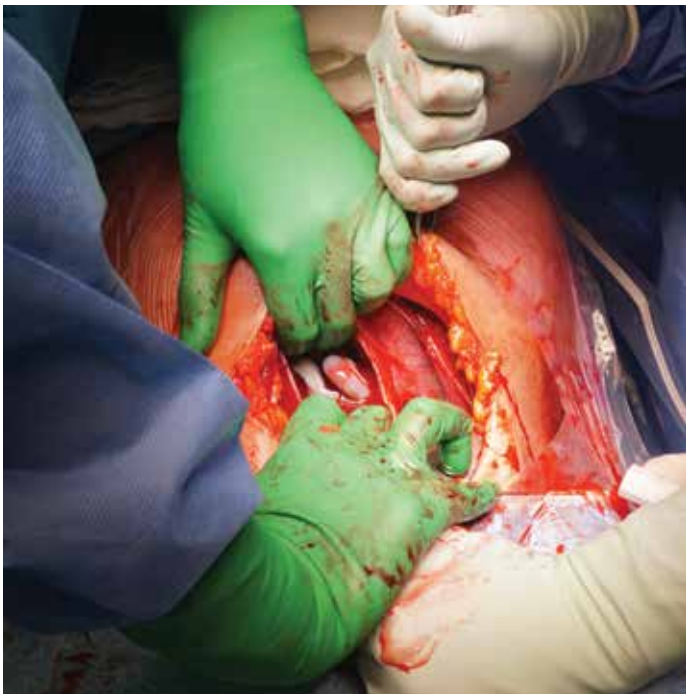
6. Blunt extension of the subcutaneous tissue and rectus sheath.



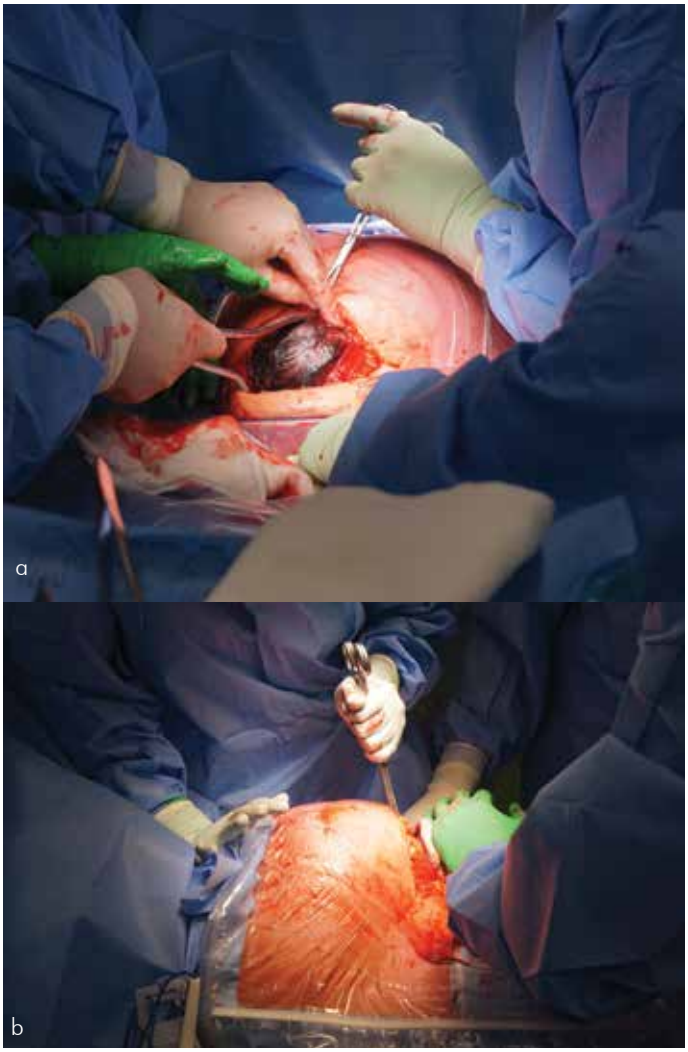
7. Blunt entry into the peritoneal cavity is used as a part of the Joel Cohen technique. This should be done high in order to avoid entering into the bladder, which may be high following prior CS or in the advanced stages of labour.



8a (top) & 8b (bottom). Creation of a bladder flap. The loose utero-vesical peritoneum is identified. It should be opened approximately 2 cm below the level of its fixed attachment to the uterus in the midline and extended laterally each side. The peritoneum can then be picked up with forceps and the bladder gently separated from the lower segment bluntly with the forefinger, or in the presence of adhesions sharply reflected down.

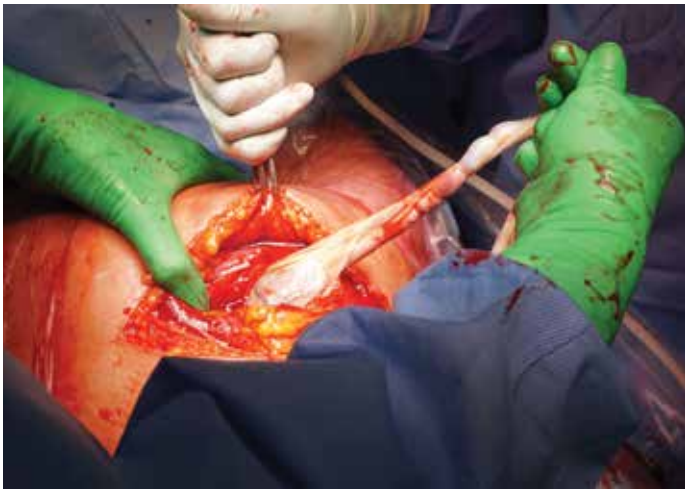


9. Uterine entry: this demonstrates cephalad-caudad blunt extension of the uterine incision performed after making a small 2–3 cm horizontal sharp incision on the lower uterine segment.

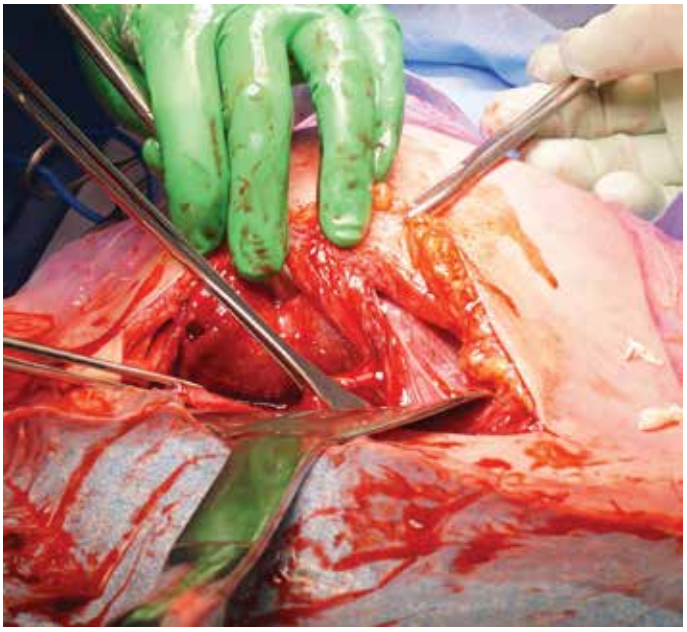


10a (top) & 10b (bottom). Delivery of the fetal head is usually achieved with flexion and elevation of the fetal head toward the uterine incision, and then completed with the addition of the assistant giving fundal pressure (10b). In photo 10a, forceps delivery of the fetal head is demonstrated, which may be necessary in the elective setting where the fetal head can still be high.

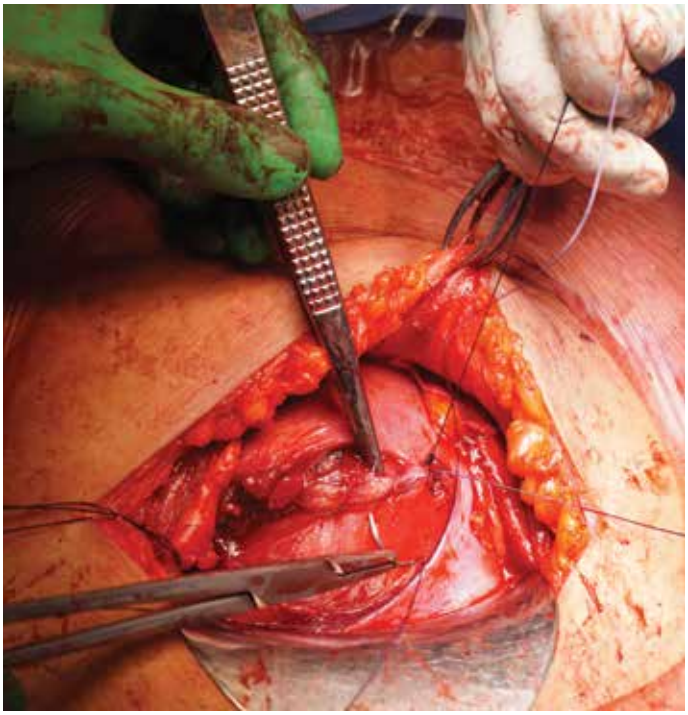
12. An oxytocic is usually given following the delivery of the baby to reduce the risk of PPH, and here is shown an oxytocin infusion, as is current evidence-based practice.



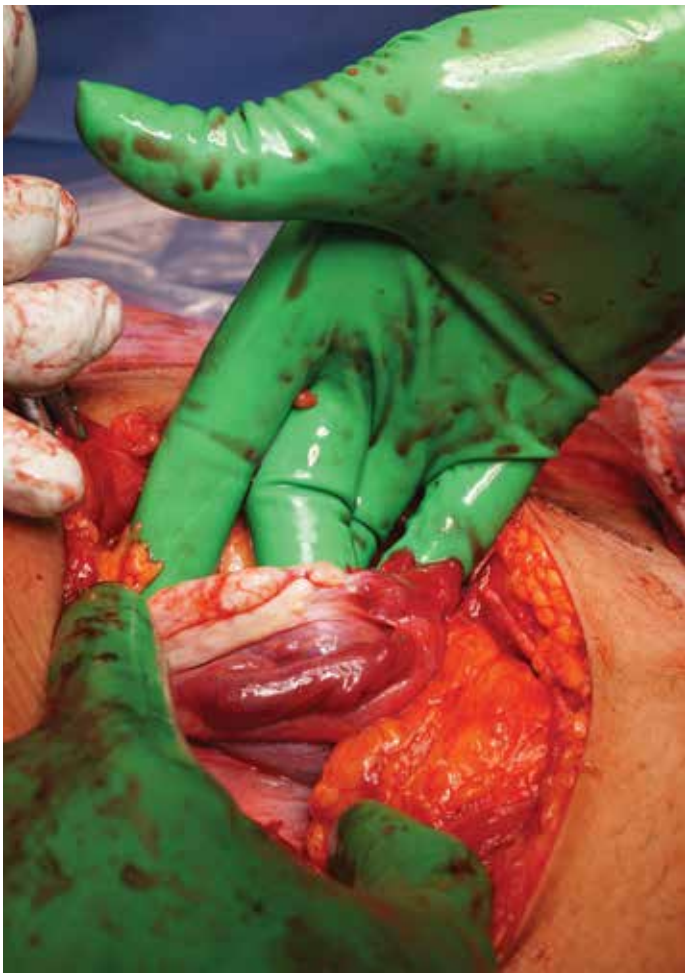
11. Spontaneous delivery of the placenta: fundal massage and controlled cord traction are being used here to achieve spontaneous delivery of the placenta.



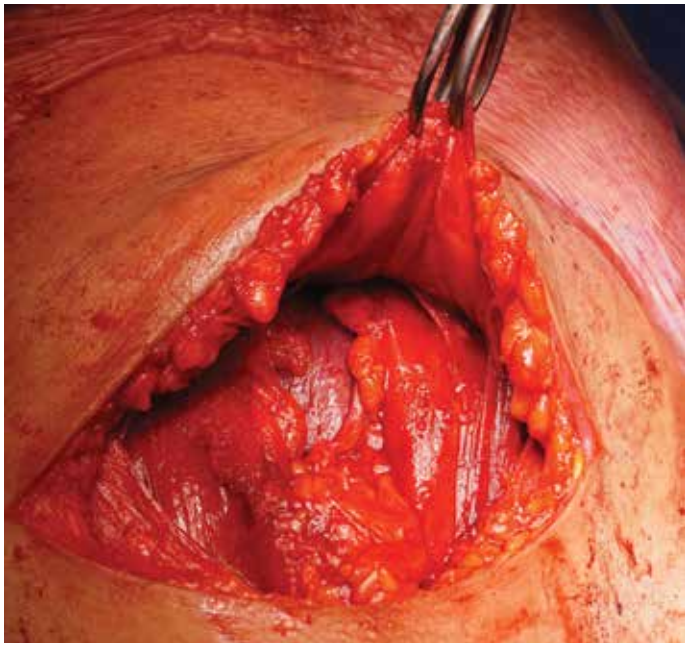
13. Identifying the uterine incision and uterine angles: it is useful to place Green-Armytage forceps on the upper and lower edges of the uterine incision to ensure they are identified correctly (particularly the lower edge, which can at times recede inferiorly and be difficult to identify because of bleeding, which has led some to mistake the posterior wall of the lower segment for the lower edge of the uterine incision). This practice also allows clear identification of the uterine angles that are often secured first.



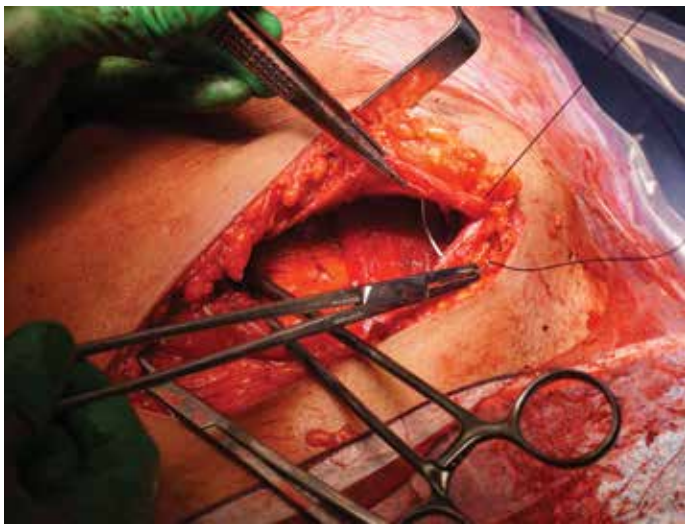
14. Closure of the uterus: here the uterus is closed with a double-layer, non-locking continuous monofilament (1 monocryl) suture. The first layer should include the cut edge of the myometrium and achieves haemostasis. The second layer pulls uncut myometrium together in order to cover the first layer.



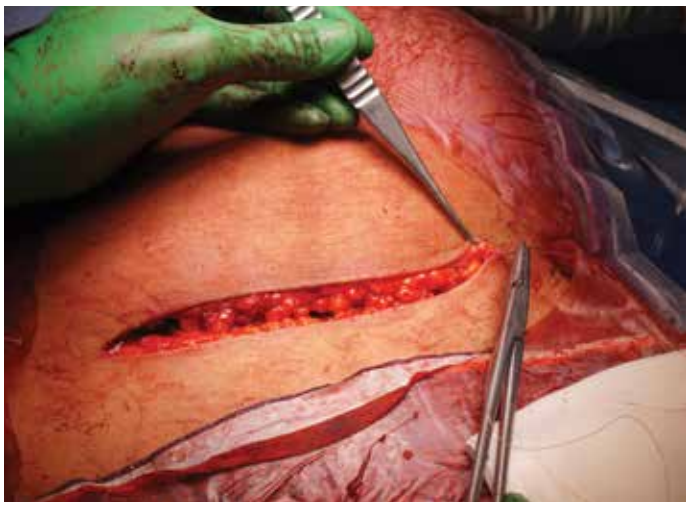
15. Checking the tubes and ovaries should be done routinely at CS, so as not to miss any adnexal pathology.



16. Non-closure of the peritoneum. Haemostasis between the rectus sheath and muscle should be checked at this point because of the risk of injury to perforating vessels during entry.



17. Rectus sheath closure is demonstrated here with a 1 PDS suture, using a continuous non-locking technique.



18. The subcutaneous fat in this instance has not been closed as it is less than 2 cm. A continuous subcutaneous suture is used for skin closure.

Ideal method of delivery: is research possible?

A/Prof Rosalie Grivell
BSc, BMBS, FRANZCOG, PhD, CMFM
Department of O&G, Flinders University and Flinders Medical Centre
Discipline of O&G, Robinson Research Institute, University of Adelaide

Dr Amanda Poprzeczny
Discipline of O&G, Robinson Research Institute, University of Adelaide
Department of O&G, Lyell McEwin Hospital

Is there a prospect of there ever being a randomised controlled trial of caesarean section (CS) versus vaginal birth (VB) for uncomplicated singleton term pregnancies? In short, the answer is no!

Despite intermittent calls and support for the performance of a large randomised controlled trial investigating the risks and benefits of elective CS versus VB for uncomplicated singleton term pregnancies, it is unlikely that this will ever occur. The idea seems to go in and out of fashion, but has never really taken off. Let's look at why this might be, from the perspective of the key stakeholders.

The women

As those of us who work in antenatal clinics and labour wards day-to-day are aware, pregnancy, labour and birth are an emotive and highly personal event in the life of a woman and her family. Many women enter pregnancy with an idea of what they wish the experience to be, or what they imagine it will be like. Surveys of healthy, low-risk, nulliparous women have revealed an overwhelming preference for VB over CS, if given the choice.[1,2] The main reasons given by women for this preference included that it was viewed as a more 'natural' way to give birth, and had a quicker recovery, as well as the avoidance, or fear, of surgery.[1]

From a patient recruitment point of view, it is likely that recruitment for a randomised trial of elective CS versus VB would be a hard sell. Antenatal patients approached about being recruited to a hypothetical trial of elective CS versus VB revealed less than 15 per cent of those women approached would willingly participate in such a trial.[3,4] This reluctance to be randomised to a mode of birth was also evident in the vaginal birth after caesarean (VBAC) study[5] in which only 22 women, of 2345 women recruited, were willing to be randomised to VBAC or elective repeat CS.

It is apparent therefore, based on the current literature and the daily experience of working with pregnant women, that women tend to have a preference for mode of delivery coming into and throughout their pregnancies, even without any prior birth experiences. In addition, they are unwilling to have that choice/option taken away from them for the purpose of the performance of a randomised controlled trial. From a practical point of view, recruitment for such a study would likely be prohibitively long term and slow.

The doctors

Despite sometimes heated debates among clinicians as to the role and safety of various modes of birth, the majority of clinicians would be unwilling to support and participate in such a randomised controlled trial.[4] The main reason given for unwillingness to recruit to such a trial was the fact that VB was seen as physiological and the most appropriate way to deliver in the absence of obstetric indication otherwise.[4] Pregnancy, labour and delivery are still seen by the majority of women and healthcare providers as a physiological process that should be allowed to run its natural course, with potential need for medical intervention only when necessary.

In a survey of healthcare providers, there was a lack of willingness to personally be recruited to, or recruit for, a hypothetical randomised controlled trial of elective CS versus normal VB.[4] The healthcare providers surveyed in this study included a random sample of RANZCOG Fellows, subspeciality urogynaecologists, colorectal surgeons and midwives. The majority of midwives, RANZCOG Fellows and colorectal surgeons surveyed were unwilling to personally (or have their partner) participate in such a trial, however, interestingly, 50 per cent of urogynaecologists surveyed stated they were willing to personally participate.[4] This could be a product of relatively few urogynaecologists included in this survey (n=12), or a result of the fact that one of the main arguments for elective CS as a mode of delivery is avoidance of damage to the pelvic floor and future pelvic organ prolapse, which is predominantly an issue of concern to urogynaecologists.

There is also an overwhelming feeling among clinicians that 'the relative complications of natural vaginal delivery and elective CS were too complex to be answered by an RCT'.[4] This raises the issue of what clinically relevant outcomes would be investigated in such a study, and whether they would be considered sufficient impetus for a clinician to recommend an elective CS with no medical indication to a woman – would it be about the pelvic floor, necessitating large numbers and decades of follow-up for a conclusive answer? Would it be a maternal mortality/morbidity outcome, also necessitating prohibitively large numbers, but shorter follow-up? Would it be a neonatal outcome, which may not adequately predict the later childhood outcomes, as was seen in the two-year follow up of the Term Breech Trial?[6] What would be sufficiently

convincing for clinicians to consider changing the prevailing overwhelming view that VB is the way the majority of low-risk term singleton pregnancies should deliver?

The research

While a randomised controlled trial is considered the pinnacle of evidence-based medicine, it is not always either warranted or ethical to perform one. At its core, research should be performed when there is a clinical question that requires an answer and there is honest doubt and disagreement among the clinical community as to the best treatment for patients, sometimes termed 'equipoise'. The presence of doubt and disagreement in medicine is termed 'collective equipoise', and has previously been defined as being present if at least 70 per cent of clinicians favour one treatment, and 30 per cent of clinicians another.[7] In the absence of sufficient clinical collective equipoise, as to one particular treatment over another, it would be considered unethical to randomise participants. This would appear to be the case with regards to the question of mode of delivery in the absence of medical indication,[4] such that performing a randomised controlled trial would be unethical and unacceptable.

It has been estimated that up to 3000 women would need to be recruited and randomised to provide adequate power to a study looking at the relative risks and benefits of elective CS versus VB for a composite of maternal short-term morbidity or urinary incontinence at three months' postnatal.[8] It is likely that such numbers would require in the order of five to 10 years of active recruitment to achieve, making it unlikely that such a study would be funded or ever proposed. With regards to short-term neonatal outcomes, numbers required would likely be lower, in the order of 600–1500 women; however, as mentioned previously, neonatal outcomes do not necessarily predict later childhood outcomes. Longer-term, but potentially more clinically important, outcomes, such as cerebral palsy or pelvic organ prolapse, would require much larger initial numbers to allow for attrition and loss to follow up over prolonged periods of time.

Large, well-designed randomised controlled trials require significant amounts of funding, and research funding is becoming increasingly scarce. All applications for funding through major bodies in Australia (for example, National Health and Medical Research Council and Australian Research Council) go through rigorous peer-review processes, and only the minority of applications are accepted and awarded funding. In light of the lack of clinician acceptance, and large numbers and long periods for recruitment and follow up, it is unlikely such a study would succeed in this environment.

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Breech presentation and external cephalic version

Dr Saman Moeed
FRANZCOG
National Women's Health
Auckland City Hospital

Worldwide, the rate of caesarean delivery is rising, with increasing scrutiny being applied to the indications for caesarean section (CS). Breech presentation is undoubtedly a significant contributor to CS rates, and affects three to four per cent of term pregnancies. Prior to the publication of the Term Breech Trial in 2000,[1] breech presentation was not routinely considered to be an indication for caesarean delivery, although it was not uncommon, especially in developed countries. Hannah et al's multicentre trial changed, perhaps irrevocably, the management of breech presentation at term and resulted in the loss of skills in vaginal breech delivery for a generation of trainee obstetricians.

The Term Breech Trial randomised 2088 women in 26 countries (both developed and developing) with frank or complete breech presentation to planned CS or planned vaginal breech birth. Trial recruitment was stopped early after interim statistical analysis showed significantly less perinatal and neonatal mortality and serious neonatal morbidity in the planned CS group than the planned vaginal breech birth group.

The trial had an almost immediate impact in many centres, with women counselled against vaginal breech birth due to the increased risk of perinatal and neonatal morbidity. Women were advised that planned CS was associated with a relative risk reduction of two-thirds compared to vaginal breech birth. In developed countries, CS rates for singleton breech presentation at term increased in the years following publication of the Term Breech Trial (Figure 1).[2]

In a 2016 meta-analysis of planned vaginal breech birth versus planned CS at term,[2] the authors concluded that vaginal breech birth carried a two- to five-fold higher risk of perinatal mortality and morbidity than planned CS (with an absolute risk of perinatal mortality of 0.3 per cent). They concluded that while the absolute risks of vaginal breech birth were relatively low, the decision regarding mode of delivery of a term breech presentation should be individualised.

In light of the increase in CS for breech presentation at term, there was renewed interest in external cephalic version (ECV) for management of breech presentation. RANZCOG recommends that women with a breech presentation fetus at or near term should be counselled about ECV and offered it if appropriate.[3] Contraindications to ECV include:

- Other reason to warrant CS
- Antepartum haemorrhage in the preceding seven days
- Abnormal CTG
- Major uterine anomaly
- Ruptured membranes
- Multiple pregnancy.

Caution should be exercised before offering ECV in the following situations:

- SGA fetus with abnormal Dopplers
- Pre-eclampsia with proteinuria
- Oligohydramnios
- Major fetal anomalies
- Uterine scar
- Unstable lie.

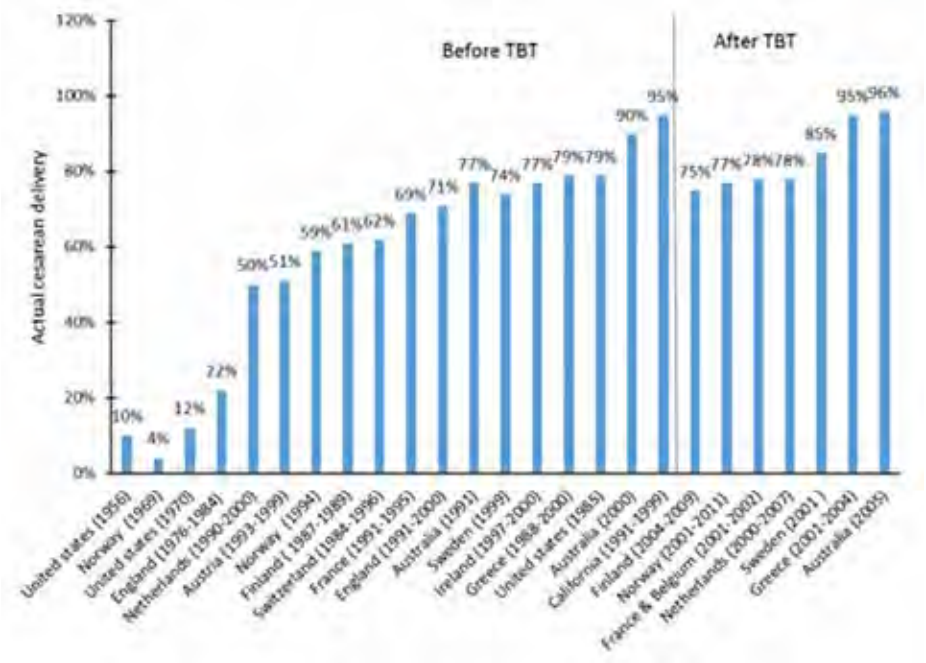

Figure 1. The proportion of caesarean delivery in term singleton breech before and after the 2000 term breech trial (TBT) in selected developed countries.[2]

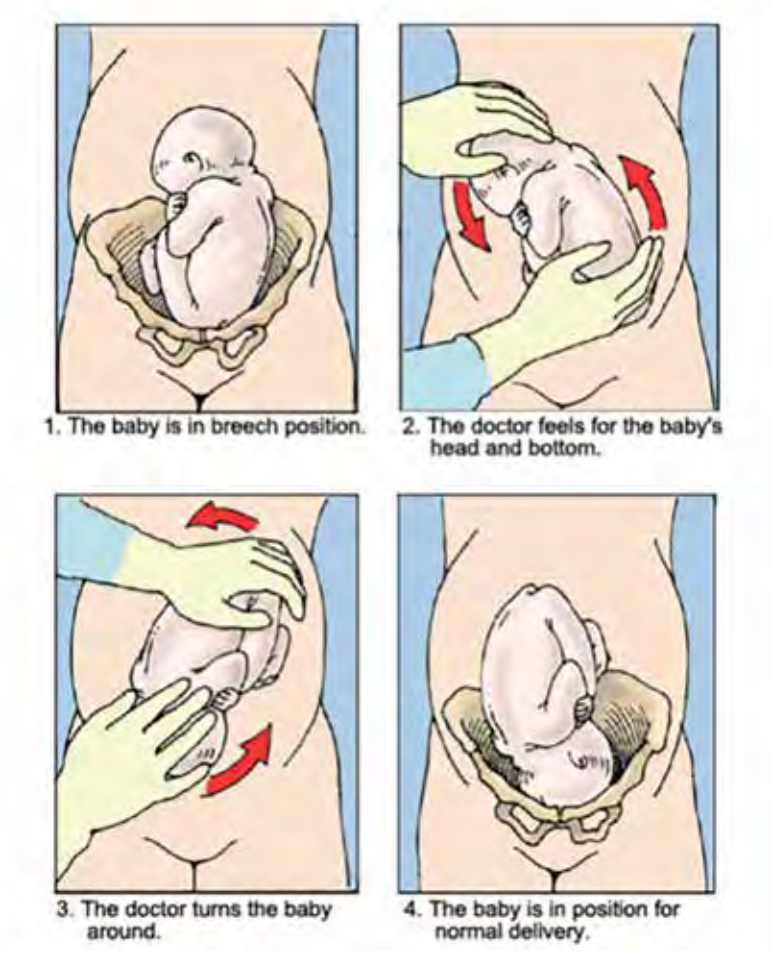

Figure 2. External cephalic version technique.[6]

The success rate of ECV at term is reported to be between 30 and 80 per cent. Many factors influence the likelihood of success, including experience of the practitioner, parity, liquor volume, uterine tone, engagement of the breech and palpability of the head and use of tocolysis. Tocolysis with salbutamol, terbutaline or nifedipine has been demonstrated to improve the success of ECV. If successful, less than five per cent of fetuses spontaneously revert to breech presentation. However, cephalic presentation following ECV may confer an increased risk of caesarean delivery compared with cephalic presentation alone.[4]

There have been some studies investigating ECV before term. A Cochrane review concluded that ECV performed between 34 and 35 weeks gestation may reduce the risk of non-cephalic presentation and vaginal breech birth, but may be associated with an increased risk of late preterm stillbirth, and advised that the option of preterm ECV should be carefully discussed with women to enable them to make an informed decision.[5]

Various techniques have been described for performing ECV. Fetal presentation should be confirmed by ultrasound scan. It is recommended that ECV should only be performed in facilities with access to emergency CS delivery, and that tocolysis should be administered according to local institutional protocols. The woman should be positioned with a wedge under her right side to minimise aorto-caval compression. Powder or aqueous gel can be applied to the maternal abdomen to improve manipulation of the fetus through maternal skin. The breech should be disengaged from the pelvis prior to attempted clockwise or anti-clockwise rotation of the head and breech (Figure 2).[6] Ausculation of the fetal heart +/- cardiotography (CTG) monitoring should be performed after ECV.

Complications from ECV are rare: less than one per cent. Reported adverse events following ECV include placental abruption, preterm labour, preterm prelabour rupture of membranes, cord prolapse, and fetal distress necessitating emergency CS.[4]

Ideally, breech presentation should be identified in the third trimester, prior to the onset of spontaneous labour. This allows time for appropriate discussion with the pregnant woman about options for management of breech presentation. ECV is not recommended once membranes have ruptured, and labour is not the ideal time for a discussion about vaginal breech birth versus CS.

After appropriate counselling, some women may opt for planned vaginal breech birth. This should take place in a facility with the availability of continuous fetal monitoring, immediate CS, and a suitably experienced obstetrician.[3] Many practising obstetricians have limited experience with vaginal breech delivery, particularly in the term fetus. Maternity units should have agreed policies on intrapartum management of breech presentation.

Management of breech presentation at term is a challenge for obstetricians today. Careful interpretation of available evidence, appropriate discussion with pregnant women, and ready access to ECV and CS facilities are needed to provide best-practice care. While vaginal breech birth in selected situations is not associated with a significant increase in maternal or neonatal risk, the increase in CS rates for breech presentation has compromised the skill of obstetricians in vaginal breech delivery.

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Promoting microbiome health: does delivery matter?

Derrick Chu
Dept of O&G, Maternal Fetal Medicine

Dr Christopher J Stewart
Dept of O&G, Maternal Fetal Medicine
Centre for Metagenomics and Microbiome Research

Dr Kjersti Aagaard
Dept of O&G, Maternal Fetal Medicine
Centre for Metagenomics and Microbiome Research
Dept of Molecular and Human Genetics
Dept of Molecular and Cell Biology
Baylor College of Medicine and Texas Children's Hospital, Houston, TX

It is 1am and Ms Jones has been labouring for 11 hours. She has made slow but semi-steady progress, and now at 9 cm dilation, the fetal heart rate tracing has reverted to a Category II. The fetal head is asynclitic and the estimated fetal weight is 4280 grams. This has been Ms Jones first near-term pregnancy and, together with your midwives, you have cared for her and her husband through her two prior miscarriages. Over this same time frame of pregnancy loss, she gave up her former passion for running marathons and gained nearly 20 kg on to her 180 cm frame. She had an early positive diabetes screen this pregnancy, and by 29 weeks she had failed oral hypoglycaemic therapy and finally achieved euglycaemia on her current dosing of 80 units of neutral protamine hagedron (NPH) and regular insulin. Both she and her husband attended the birthing and breastfeeding classes you give on Thursday nights with your team of midwives, and their birth plan calls for a safe vaginal delivery, tummy time and early immediate breastfeeding. However, both Ms Jones and her husband have told you that while their goal is a vaginal birth, they have built a trusting relationship with you over these many years and would ask for a recommendation as to when a caesarean section (CS) will be the better option. As you interpret the Category II tracing, reassess the fetal weight, slow descent, persistent asyncliticism and her pelvis, your many years of experience as an obstetrician come to bear. Weighing the risks of ongoing labour and potential for maternal and fetal harm versus the benefit of a CS, you make the decision to now offer Ms Jones a CS. As you discuss the risks, benefits, alternatives and limitations, the immediate benefits relative to the apparently imminent risks of ongoing labour appeal to both Ms Jones and her husband. As you prepare to leave the room and ready for the CS, she asks you one last question, 'Excuse me Dr Apple, but are there any long-term risks to my baby with a CS?' With a kind but gentle sigh, you sit back down at her bedside and begin a longer and currently less evidence-based discussion that ends with evermore questions than answers.

For the practising obstetrician and midwife, the above scenario is everyday medicine, where the minute-to-minute decisions must be made in the best interest of mother and baby. To the epidemiologist, this is another CS contributing to a population trend that has been steadily increasing for nearly 50 years. To the neonatologist, this represents an occasion where potential immediate newborn harm will be avoided. To the paediatrician and the lactation consultant, the next focus will be enabling exclusive breastfeeding for the next six months. To the paediatric allergist and immunologist, this is a potential atopic child in the making. To the nutritionist, this is a risk for early childhood obesity. And to the parents? This is their firstborn child for whom they want a healthy life, free of disease and harm. While once all we had to consider was 'what is best for Ms Jones and her baby' on the delivery ward, we are now challenged to balance and consider often competing risks with unclear long-term health outcomes.

In this article, we will attempt to clarify and summarise several key studies that have led to the belief (but not yet proven truth) that a CS has the potential for long-term harm for the offspring. We will balance this discussion with evidence reminding us that it may be the underlying indication for the CS or related post-delivery course, rather than the surgery itself, which renders these risks. Finally, we will highlight where we are lacking evidence and clinical trials that may provide meaningful interventions to prevent some of the downstream harm to children of CS deliveries, without compromising immediate maternal or infant health.

While it is understood by the obstetrician and midwife, it is critically important to recognise that there are many pathways that lead to an indication for a CS. Some of these risk factors may necessitate or precipitate CS, or the resultant impact of a CS on the child's care in the immediate postnatal period, and thus may confound interpretations of longer term CS-attributed risk. Similarly, the immediate infant postnatal and later paediatric interval may share environmental risk factors with the prenatal environment, and if those risks factors are independent predictors of the CS, then mitigation of risk must involve longer-term and precedent interventions. In other words, an infant can only be delivered one of two ways, but the developmental and clinical paths that result in either of these two delivery outcomes are certainly more diverse and complex than the dichotomous nature of delivery suggests.

As birth attendants readily appreciate, in most cases, CS is performed for a specific obstetric, fetal or maternal indication aimed at reducing the near risk of morbidity or mortality for either the mother or the fetus. Some of these indications are sporadic, and may have relatively limited antecedent risk. For example, in instances of complete placenta praevia or vasa praevia, vaginal birth would be lethal to the mother and/or fetus. However, other relative risks have antecedent factors that are likely more insidious and parlay as postnatal risks. In Ms Jones case, her recently acquired preconception obesity rendered a platform for her probable type II diabetes. Together, these served as a likely strong contributor leading to the development of a borderline macrosomic infant, which in turn was

ascynclitic and did not descend readily into the pelvis. Moreover, these same maternal metabolic disturbances may be associated with a reduced likelihood for initiating lactation, and similarly have a lower chance of being able to maintain exclusive breastmilk feedings over the ensuing six months. Add into this scenario such typical confounders as familial subpar nutrition and decreased activity, and this becomes an only too often scenario that will culminate in risk for childhood obesity and atopic disease. When examining risks in population-wide studies, it becomes challenging to discern whether it was it the CS or the company it kept that rendered these longer-term risks across the lifetime of the progeny.

CS is the most commonly performed major surgical procedure in the US, accounting for over one million operations annually.[1] Whereas one-in-20 births was via CS four decades ago, now one-in-three to -four births occur by this route. The appropriate rate of CS necessary to assure healthy delivery is not easily determined, since it is dependent on not only multiple maternal, fetal and obstetrical comorbidities and risk factors, but also on the incidence of primary CS. Both the prevalence and relative safety of CS in competent hands and suitable settings has resulted in less apprehension on the part of patients and physicians alike, and the attributable risk of significant morbidity and mortality (at least with primary CS) is extremely low. However, in recent years, tremendous scrutiny has been placed on CS, largely in part to its real or perceived risk of future disease or harm.[2]

While there is limited maternal risk with primary CS, repeated surgeries in subsequent pregnancies may be associated with bowel and bladder trauma, surgical adhesions and scarring, uterine scar separation, and morbidly adherent placentation (such as, placenta accreta or percreta with indicated need for caesarean hysterectomy and high risk of accompanying massive blood transfusions and surgical complications). Recognising these real hazards (albeit relatively low occurring but highly morbid), there have been multi-pronged approaches undertaken to reduce the CS rate, including efforts specifically aimed at fewer primary surgeries. The completion of the Human Microbiome Project in 2011, which sought to describe and catalogue the 'healthy' adult repertoire of commensal bacteria, has since galvanised investigators to closely examine how our microbiota contribute to both health and disease.[3] One prominent focus of the field has been to determine when and how newborns begin to acquire commensal microbiota, and how these early patterns of colonisation may influence normal developmental processes. Literature to date indicates that microbiota play a key role in energy homeostasis, as well as patterning the immune and neurologic systems in early life; ergo, acquiring the right microbes at the right time is thought to be essential.[4]

As such, the potential impact of a CS on the early colonisation of the infant microbiome has garnered significant attention in both the scientific and lay press, in part because of the worldwide increase of CS over the past four decades and the reported association of CS with obesity and atopic disease. In particular, there is much debate on whether CS increases the infant's risk of several diseases later in life, and whether any of these diseases result from a lack of exposure to the mother's vaginal microbiota during birth.[5] Recent evidence has indicated a potential association between CS and increased rates of atopic disease and IgE-mediated sensitisation to food allergens, as well as metabolic syndrome and obesity later in life. For instance, a recent large prospective study with 22 068 participants tracked over 16 years found a mere 13 per cent adjusted increased risk of obesity later in life if that individual was delivered by CS.[6] Additional large and robust epidemiological studies have been performed in an effort to explore the influence of birth mode on disease risk. Such studies are typically in agreement that the late-life risk of either metabolic disease obesity or atopy is increased in infants delivered by CS. For instance, in an epidemiological analysis of 2917 children aged eight years, CS was found to increase the risk of allergy by 1.5 fold (increasing to 4.5 fold if at least one parent was allergic).[24] A similar trend was reported in asthma risk from a large meta-analysis of 1 206 679 infants (23 studies), where CS was reported to increase the risk of allergy by more than 20 per cent.[25] Of note, these are relatively small effect size estimates, despite their statistical significance.

Despite the robustness in terms of numbers of subjects analysed and statistical methodology, given the small and modest effect size measures it is still unclear how much of this attributed risk is actually due to the CS procedure itself, rather than the risk factors that led to the CS in the first place (or the postnatal factors that followed).[6,24-26] Investigators studying the human microbiome have been quick to attribute this perceived risk of CS to a lack of exposure to the mother's vaginal microbiota during delivery.[6] So, what do we know from the available literature about the association of CS on the gut microbiota and associated disease risk?

While the fetus does not develop in a sterile intrauterine environment,[7–14] there is an additional influx of viable microbes approximating the time of delivery. Early studies concluded that because maternal skin and vaginal microbiomes are distinct, with dominance of *Staphylococcus* sp. or *Lactobacillus* sp. respectively, that the microbiome of the infant at various sites (skin, oral, respiratory and gut) immediately following birth would closely resemble the corresponding maternal site per birth mode.[15] In this landmark work, Dominguez-Bellow and colleagues very eloquently described differences among Mestizo and Amerindian women in Venezuela. Their cohort was comprised of nine women and 10 neonates; four gravidae and their four neonates made up the vaginal cohort, and five gravidae and six neonates were included in the CS cohort. Of these five gravidae delivered by CS, one surgery was performed for a set of male twins. While, except for the twins, the exact weight of each neonate was not given, the methods section of the manuscript states, 'All mothers had healthy pregnancies and all babies were born at term, without complications. Babies weighed between two and 5.2 kg (the smallest baby was the twin in second order of birth, after his 3 kg brother.' However, this description does not meet standard definitions of 'healthy and uncomplicated'. First, the presumptive dizygotic twins (chorionicity was not provided, and both were male, so mono- versus di-zygosity is unclear) were 33 per cent discordant in growth with reported weights of 2 kg and 3 kg (discordance=[birthweight of larger twin-birthweight of smaller twin/larger twin birth weight] x 100). Second, at least one neonate was impressively macrosomic. While we do not know whether this 5.2 kg infant was delivered vaginally or via CS, in the USA, CS is typically offered to diabetic mothers with a fetus estimated at >4.5 kg and a non-diabetic mother with a fetus estimated at more than 5 kg. A 5.2 kg fetus would be 0.8 to 1 kg larger than >98th percentile of the birth population using published WHO growth standards for male and female newborns, respectively.

While this small, but highly cited, landmark study, unfortunately, did not provide the underlying indication for the CS,[15] it is not alone in its lack of reporting antecedent risk. In fact, a detailed examination of additional often cited and recent microbiome studies reporting on a presumptively positive association between CS and a perturbed gut microbiome in the offspring, there is a

Born by caesarean – but what about the baby's biome?

notable absence of ability to account for primary maternal or fetal comorbidities known to render increased risk of CS, such as maternal prepregnancy BMI, nulliparity, gestational or type II diabetes, maternal weight gain, or fetal macrosomia.[16-21] Of interest, Yassour et al[22] demonstrated that 20 per cent of vaginally delivered infants manifest a microbial pattern hallmarked by a lack of *Bacteroides* over the first 12 months of life, after which the mode of birth had no effect on microbiome profiles. This lack of significant difference between CS or vaginally delivered infants after one year of life is aligned with data from well-designed studies of the infant microbiome in early childhood.[17,22,23] When considered collectively and carefully, it may be argued that since low or absent Bacteroides may also occur among vaginally delivered infants,[22] the summary conclusions of other studies that are either small in number, low in CS rate, or limited due to treatment of CS as an independent categorical variable and failing to account for antecedent maternal risk factors, ought be taken with a note of caution.

It is not our intent to be critical of the landmark work of our respected colleagues and the importance of their observations, but rather to seek to identify true causal links and not spurious or potentially misclassified risks. Nevertheless, if the medical indication or antecedent risk for the CS, (rather than the surgical procedure itself) puts the child at risk for later-in-life disease, earlier interventions that target the maternal health issue will not only reduce the prevalence of CS, but would be both necessary and sufficient for preventing those later health risks in the child. For example, if it is maternal diet overly rich in calories that both disturbs the establishment of the infant's microbiome and renders a large baby that cannot readily or safely fit through the birth canal, then any truly helpful interventions would be aimed at reducing the excess calories in her diet. Conversely, if it is a postnatal event that happens to co-associate with CS, then the mode of delivery becomes irrelevant and effective modifiers would be needed after birth. Such postnatal factors would, for instance, include breastmilk versus formula feeding; obese women, who coincidentally have higher rates of CS, are more likely to formula feed. Hence, it is vitally important to understand whether it is the surgery, its indication, or postnatal factors that may be behind reported links between CS and infant atopic diseases or obesity risks later in life.

Alternatively, what evidence exists for other potential factors that independently affect the microbiome and are also associated with increased occurrence of CS? Obesity and a maternal high-fat diet are perhaps the most well-studied confounders that may alternatively explain the observed impact of CS on the microbiome. It is widely accepted that dietary components and obesity status are major drivers of the gut microbiota composition, with well-established examples of causality in murine models. Transference of gut microbiota from obese to germ-free mice (devoid of any microbiota) promotes increased adiposity, while consumption of a high-fat diet similarly promotes adiposity by rapidly altering the gut microbiome. We have similarly used a primate model to demonstrate that maternal diet during pregnancy and lactation infers significant and persistent alterations to the juvenile microbiome, even when juveniles are cohoused and switched back to a healthy diet after weaning.[28] More recently, we have recapitulated many of these findings in a large human cohort of mothers and their infants, demonstrating that a maternal diet high in fat (>40%), is associated with changes to the infant microbiome at birth and up to at least four to six weeks after birth.[29] Notably, one of the major microbiota negatively associated with a maternal high-fat diet, *Bacteroides*, has been reported by others to be in low abundance due to CS,[15-21] and thus may alternatively account for the perceived impact of CS on the infant microbiome. However, as noted above, maternal diet during pregnancy and other similar potential risk factors for CS have been largely underreported and unaccounted for in many studies.

So, can anything potentially beneficial be done at the time of CS? To answer this question, Dominguez-Bello and colleagues took an innovative and provocative approach to 'restore' the infant microbiome of CS infants with maternal vaginal flora.[27] By incubating a gauze in the mother's vagina for one hour before surgery and subsequently 'wiping' the neonate's mouth, face and body at the time of delivery, the team described that they were able to 'partially restore' bacterial members from the vaginal flora into the neonate microbiome when measured over 30 days. Here again, the details of the study may be important in the interpretation. While only four of 11 CS neonates were exposed to vaginal wiping, in CS babies exposed to maternal vaginal fluids, the skin and oral sites were most comparable to vaginally delivered infants, whereas the anal site remained more comparable to CS infants who did not undergo vaginal wiping. They

conclude that CS babies 'lacked the vaginal bacteria that were restored by swabbing infants with gauze or that were present in vaginally delivered infants, particularly anal and skin *Lactobacillus* early in life'. However, there are a number of interesting considerations and possible confounders. First, the only neonates and infants that were exclusively breastfed were born vaginally and all CS infants received at least some formula. Second, the supplemental methods reveal inconsistent and limited sampling among subjects at all of the time points and between body sites. For example, the authors comment, 'In anal samples from exposed infants and vaginally delivered infants, there was an early enrichment of *Lactobaccillus* followed by a bloom of *Bacteroides* from week two, which was not observed in newborns that were not exposed to vaginal fluids.' However, this conclusion is based on a single CS infant sampled at day 7 and 14 and the referenced relative abundance plots do not appear to display *Bacteroides*.[27] Nonetheless, this proof-of-principle study suggests one innovative potential method of partially restoring microbiota in neonates.

Coming back around to Ms Jones, what do we tell her and her husband about the longer-term risks of CS for their baby? While that is ultimately up to the confidence and interpretation of the provider, one option is to simply state that there are potential early signs from studies in other corners of the world that warn of increased risk for asthma, allergy and obesity. However, the proportion of those risks that are actually due to the CS surgery itself, how much can be restored with exclusive breastfeeding and healthy habits throughout childhood, and how much will vary by factors we don't yet understand.

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Delivery of multiple pregnancies

Dr Kieren Wilson
Advanced FRANZCOG Trainee

Prof Dilly Anumba
MD FRCOG
Maternal-Fetal Medicine Specialist

The incidence of multiple pregnancies is rising across many parts of the world. The Australian Bureau of Statistics reported 4316 sets of twins, representing 1.5 per cent of all births and 65 sets of triplets and higher order multiples, making up 0.02 per cent of all births in Australia for 2014.[1] During the same reporting period there were 10 989 maternities with multiple births in England. This represents 1.6 per cent of all maternities and in excess of 22 000 babies born.[2] The increase in higher order pregnancies has been attributed to the widespread use of assisted reproduction techniques resulting from delayed childbirth and advanced maternal age at conception.[3] The management of women with higher order multiple pregnancies brings unique challenges to healthcare providers. One of the key challenges is the decision regarding the most appropriate mode of birth. Both timing and mode of birth for twins is a subject of considerable debate and the safety of term vaginal birth (VB) for twins has long been of concern.

The appropriate intrapartum management of twin pregnancy remains a controversial issue in obstetric practice. The Twin Birth Study has provided level-one evidence that at least most twins after 32 weeks should be delivered by planned VB provided the leading twin is cephalic and there is an experienced operator in attendance, with facilities to carry out an immediate lower segment caesarean section (CS) if the need arises.[4] In addition, this study provided clearer information about the optimal methods of delivering the second, non-vertex twin. The time interval between the twin VB in this study was 10 to 16 minutes.[4] This seems to be associated with the best health outcomes.

It is common clinical practice for uncomplicated monochorionic twins to be born at 36–37[5,6] weeks and dichorionic twins at 37–38 weeks.[7] This is based on the risk at this gestation of intrauterine mortality from placental insufficiency of twin pregnancies which is stated to equal that of post-term singleton pregnancies.[8,9] The timing of birth, either by induction or elective CS, is an important consideration in twin birth. The purpose of this discussion is to review the evidence around different modes of birth in the management of twin pregnancies.

Vaginal delivery for twin births

The Twin Birth Study, published in 2013, was a large, prospective, international randomised controlled trial of 1398 women (2795 fetuses) who were randomly assigned to planned cesarean delivery or 1406 women (2812 fetuses) to planned vaginal delivery between 32 and 38 weeks gestation, where the presenting twin was cephalic. The rate of cesarean delivery was 90.7 per cent in the planned-cesarean-delivery group and 43.8 per cent in the planned-VB group.[2] This study reported that planned CS did not reduce the risk of fetal or neonatal death or serious neonatal morbidity when compared with planned VB. This supports the practice of planned VB in women with an uncomplicated pregnancy when the first twin is in a cephalic presentation. These findings were confirmed by Castro et al who found that VB of twin pregnancies can be successful, especially for women who have had previous VB.[10]

The intrapartum management of twins presents difficulties and challenges. Often, external monitoring of the heart rate of the fetuses can be difficult and performing fetal scalp sampling is only feasible for the leading twin. Other requirements for managing labour for women with a twin gestation include the presence throughout labour and delivery of a skilled obstetrician, midwife, obstetric anaesthetist and paediatric specialist. Intravenous access is required, as are immediate availability of blood products and uterotonic agents and rapid access to operating theatres.[11] Monochoronic twins have a 1.5–2.5 per cent risk of intrapartum twin-to-twin transfusion syndrome.[12] If this occurs, both twins require immediate delivery. Of great importance throughout labour and delivery is that the obstetrician has a carefully considered plan regarding what he or she will do in the event of cord prolapse, placental separation before birth of the second twin, change in position of the second twin during birth of the first, or immediate postpartum heamorrhage. The use of epidural analgesia during twin labour may enable prompt abdominal delivery of the second twin if this becomes indicated following VB of the leading twin. The increasing number of women with a twin pregnancy requires there be sufficient appropriately trained birth attendants to manage the twin births.

Elective CS for twin births

Obstetricians are performing an increasing number of CS for non-vertex presentations. Absolute indications for elective CS are few, and there are no level-one evidenced clinical studies on which to base strong recommendations.[3] From the available literature, CS without a trial of labour should be carried out in cases of conjoined twins and mono-amniotic twins.[13] Level-two evidence from Vendettii also confirmed that, under these circumstances, a policy of

planned cesarean delivery from 34 weeks gestation is indicated.[14] An advantage of delivering twins by elective CS is it can be done during daylight hours when appropriate staffing levels and support from paediatrics are more readily available. The risk of fetal distress associated with labour, especially for the second twin, is obviated and the woman knows when her babies will be born.[3] The maternal risks associated with an elective twin caesarean include bleeding, infection, visceral organ damage, urinary tract infection, wound dehiscence, pneumonia, deep vein thrombosis and pulmonary embolus. There are also implications for any future pregnancies, such as placenta accreta, that need to be taken into consideration when counselling women about a CS. The fetal risk of transient tachypnoea of the newborn, respiratory distress syndrome, and even persistent fetal circulation associated with elective CS is likely to be higher in twin pregnancies and should be discussed and documented when counselling women about twin birth. Planned cesarean section may decrease the risk of a low five-minute Apgar score, particularly if the first twin is breech.[15] Otherwise, there is no evidence to support planned cesarean section for uncomplicated twin pregnancies.[16]

The retained second twin

The retained second twin presents a unique challenge in labour. After the birth of the first twin, the position and presentation of the second twin should be carefully monitored.[17] Intravenous oxytocin infusion should be ready so that uterine contractions can be re-established promptly. Retention of the second twin occurs when its delivery has not taken place for approximately 15 to 30 minutes or more following the birth of the first. In the Twin Birth Study, the mean interval between the twins was eight minutes, with a range from one to 33 minutes. The longer the second twin remains in utero the greater the risks, since the birth of the first twin is followed by reduction in the utero-placental blood flow, thus compromising the oxygen and nutritional supplies to the second twin.[18]

The predisposing causes of retention of the second twin are uterine atony, inadvertent administration of ergometrine following the delivery of the first in an undiagnosed twin pregnancy, a constriction ring clamping down on a larger second twin, obstruction from malpresentation or malposition, rupture of forewaters in a monochorionic twin pregnancy, and retention of the second twin in a horn of a congenitally malformed uterus.[19] Frequent maternal complications are chorioamnionitis, postpartum haemorrhage, retained placenta and placental abruption. Fetal complications include fetal distress and malpresentation. There are three delivery options in such circumstances:

1. Breech extraction (coupled with internal version in the case of a transverse lie) and vaginal delivery of the second twin
2. External version and delivery of the second twin vaginally from vertex presentation
3. Combined vaginal-caesarean delivery.[18]

The decision to carry out breech extraction, operative vacuum or forceps will be aided by some assessment of the estimated fetal weight of the second twin and any other maternal or fetal risk factors. The optimal conditions to perform a breech extraction or instrumental delivery are: cervix fully dilated, presenting part engaged, appropriate maternal analgesia, strong regular contractions and no fetal distress. There is significant published literature suggesting breech extraction of the non-vertex second twin is preferable to external cephalic version because it appears to be associated with a significantly lower incidence of fetal distress and abdominal delivery with comparable neonatal outcome.[20] Such extraction may require internal podalic version if the fetal

feet are more readily accessible to the birth attendant than the vertex.

Emergency CS for the retained twin

Although CS of a second twin after VB of the first twin is rare, it has clinical importance as an acute obstetric emergency.[21] Various problems mandate that obstetricians deliver a second twin quickly after the first has been born. Common indications are imminent uterine asphyxia and suspected fetal distress, transverse lie with or without prolapse of umbilical cords or limbs, and when rapid VB seems unlikely.[15] Risk factors for emergency cesarean section of the second twin are preterm delivery, previous CS, placental abruption and breech presentation.[22] Nevertheless, short-term perinatal outcomes are comparable to twins born vaginally.

In conclusion, the mode of birth for women with a twin pregnancy remains controversial. The Twin Birth Study has given clinicians reassurance that it is safe to undertake a trial of labour when the leading twin is in a cephalic presentation. There are currently no absolute indications for a CS in the absence of other obstetric complications. Management of the second twin will continue to challenge obstetricians and midwives. Therefore, appropriate patient counselling and high-quality multidisciplinary team management of women with twin pregnancies will help ensure good outcomes and the safety of women and their babies.

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Q&a

For the broader *O&G Magazine* readership, balanced answers to those curly-yet-common questions in obstetrics and gynaecology.

Q *'A 22-year-old nulliparous woman presents to your hospital with ruptured membranes for 12 hours at 39+5 gestation, but not in labour. What is the best approach to managing this patient, especially in terms of antibiotics?'*

Dr Ann Formaz-Preston
MBBS BSc
Resident Medical Officer
Royal North Shore Hospital, Sydney

Prof Jonathan Morris AM
MB ChB, FRANZCOG, CMFM, PhD
Professor of Obstetrics and Gynaecology and Director, Kolling Institute of Medical Research, Northern Clinical School
University of Sydney

a Term prelabour rupture of membranes (PROM) occurs in one in 12 pregnancies. Spontaneous onset of labour and birth is common following PROM, with reported rates of 70 per cent, 85 per cent and 95 per cent at within 24 hours, 48 hours and 96 hours, respectively.[1,2]

The management of term PROM depends on several factors, including maternal and fetal wellbeing at the time of assessment, maternal choice, fetal presentation, Group B Streptococcus (GBS) status and time since rupture of membranes (ROM). The two main issues upon which decision-making is predicated are:

1. the timing of interventions to augment birth
2. the use of antibiotics.

Before any management plan is determined, it is important to confirm gestational age, obtain a detailed history and perform a thorough examination, including a low vaginal swab in those women who have not had routine antenatal screening.

Membrane rupture can be confirmed by careful history taking and bedside examination, including inspection of any pads or fluid that can be seen. The presence of blood or meconium should be noted. If the diagnosis is uncertain, then sterile speculum examination and testing for amniotic fluid in the vaginal vault with point-of-care testing such as nitrazine (Amnicator), placental alpha-microglobulin 1 protein (Amnisure) testing or microscopic analysis should be performed. At that time, swabs for culture can be taken.

Fetal wellbeing should be assessed with auscultation of the fetal heart rate and recording of fetal movements. In addition, fetal presentation should be determined with particular regard to engagement of the presenting part. Signs of fetal distress or clinical chorioamnionitis should prompt urgent delivery.

If the fetus is in a cephalic presentation, recent RANZCOG guidelines recommend offering active management of term PROM based on a reduction in chorioamnionitis and endometritis and increase in satisfaction among mothers with induction of labour (IOL).[2-4] The optimum timing of IOL is debated and there is variety in practice worldwide. National Institute for Health and Care Excellence (NICE) guidelines suggest IOL at 24 hours after ROM[5] and ACOG guidelines recommend that if labour does not commence at the time of presentation, then it should be induced.[6] Maternal preference must also be taken into consideration as this is part of the shared decision-making process.

Expectant management is appropriate in a subset of women presenting with term PROM. RANZCOG sets out criteria for when it can be considered a safe option. Expectant management can occur at home or in a hospital setting and is dictated primarily by the ability to provide good monitoring, support for the woman and maternal wishes.[3]

There is clear guidance that in the case of GBS colonisation antibiotics should be commenced.[7] There is less clear consensus for the administration of prophylactic antibiotics in women without proven GBS. It has been shown that as time passes from the ROM, the risk of chorioamnionitis and endomyometritis increases[8] as does neonatal septicaemia.[9] Morbidity due to chorioamnionitis increases significantly after 12 hours since ROM.[8]

> 'The current RANZCOG statement acknowledges that there 'appears to be a reduced risk of maternal infectious morbidity' with antibiotic use, but does not make a clear recommendation for administration.'

The current RANZCOG statement acknowledges that there 'appears to be a reduced risk of maternal infectious morbidity' with antibiotic use, but does not make a clear recommendation for administration. This is largely based on a 2002 Cochrane review of two trials that compared the outcomes of antibiotics given with IOL 12 or more hours after PROM.[10]

The most recent Cochrane Database Systematic Review (2014) recommends against the routine administration of prophylactic antibiotics.[11] The change in recommendation from the 2002 review comes from inclusion of two more recent randomised trials.

A more recent meta-analysis of five randomised trials in a secondary subgroup analysis suggested a significant decrease in rates of chorioamnionitis and endometritis in women with 12 hours or greater or ruptured membranes if treated with antibiotics.[12] Such a policy needs to be balanced with public health concerns regarding the widespread overuse of antibiotics.

In this case, a primigravid woman who has had ruptured membranes for 12 hours, with no risk factors, an appropriate management plan would be to offer IOL and withhold antibiotics unless there were clinical signs of infection. Should prophylactic antibiotics be considered, ampicillin would be the most appropriate choice in the absence of any concern around hypersensitivity. Babies born following PROM should be observed appropriately for signs of infection.

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Case report

A caesarean scar ectopic pregnancy treated in the second trimester

Dr Rosalie Fergusson
MBChB, PGDipOMG, FRANZCOG Trainee
Middlemore Hospital

Dr Katherine Sowden
FRANZCOG
Middlemore Hospital

Dr Doug Barclay
MRCOG, FRANZCOG
Middlemore Hospital

Dr Robin Montgomery
FRANZCOG
Middlemore Hospital

Adrienne Laing
O&G Services Manager
Middlemore Hospital

Mrs F was a 36-year-old gravida 9 para 7 woman with a history of three normal vaginal births, four elective caesarean sections (CS) and a dilation and curettage (D&C) for first trimester missed miscarriage. Previous births had been complicated by postpartum haemorrhage and manual removal of placenta. Her BMI was 35 and she had a background of essential hypertension, but was otherwise well. The pregnancy in question was unplanned and Mrs F did not desire future fertility.

Mrs F was referred to acute gynaecology services by her GP, after a dating ultrasound scan (USS) suggested that the position of the gestational sac was close to the CS scar. The images were subsequently repeated and reviewed by several radiologists and obstetricians, and differing opinions emerged as to her diagnosis – live scar ectopic pregnancy versus viable intrauterine pregnancy with or without placenta accreta.

Owing to these differing opinions, further discussions between specialists and missed appointments on the patient's behalf, Mrs F continued to be managed expectantly and regular follow-ups were arranged. During this time she developed microscopic haematuria and placenta percreta became a concern. She underwent a magnetic resonance imaging (MRI) scan at 12 weeks gestation that confirmed a lower uterine scar ectopic pregnancy, with thin myometrium and large serosal blood vessels, but no urinary bladder invasion (Figure 1). She was referred to local maternal-fetal medicine services at 13 weeks and three days, to consider medical treatment with intrasac potassium chloride (KCl) and methotrexate, or alternatively feticide before planning surgical management in order to limit the size and vascularity of the pregnancy. However, although technically feasible, this was thought to potentially increase the risk of acute haemorrhage, which would require emergency surgery.

A wedge resection or a hysterectomy were then proposed as treatments. As the patient did not desire future fertility and owing to her future risk for ectopic pregnancy/abnormal placentation, hysterectomy was performed at 13 weeks and four days gestation, with the legal requirements for termination of pregnancy met. The hysterectomy was performed via midline laparotomy, with cystoscopy and placement of ureteric stents at the commencement of the procedure. Intraoperative findings confirmed no bladder invasion and a highly vascular uterus of a 12–14 weeks gestation size, with an obvious defect in the low segment.

The surgery was technically challenging, and Mrs F returned to theatre twice for re-laparotomy, owing to ongoing bleeding (total estimated blood loss: 12 L), and eventually required uterine artery embolisation. She was discharged home five days postoperatively, and was followed up as an outpatient.

Clinical issues highlighted by this case include:

1. The difficulty of achieving a definite diagnosis, owing to differing opinions regarding USS appearances
2. A lack of evidence for optimal treatment of a second-trimester scar ectopic pregnancy.

Diagnostic criteria

The difficulty in diagnosing a scar ectopic pregnancy is consistently reported (with the diagnosis missed in over 13.6 per cent of cases in one review), and incorrectly diagnosed as a cervical pregnancy, spontaneous miscarriage or low intrauterine

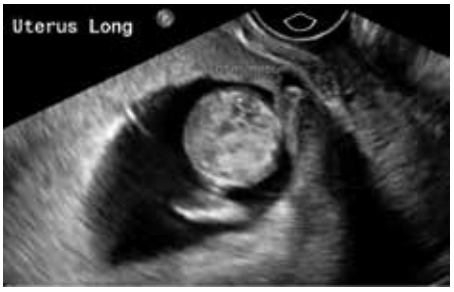

Figure 1. MRI scan at 12 weeks gestation.

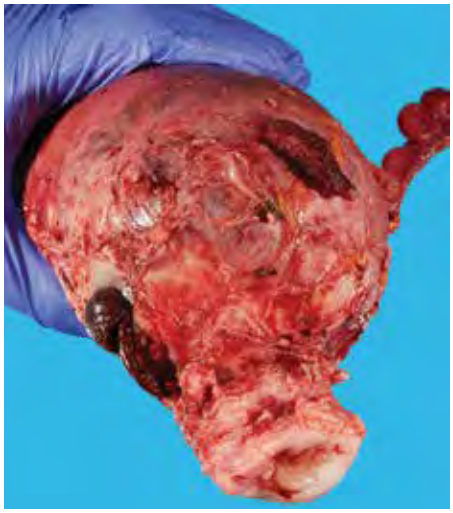

Figure 2. Hysterectomy.

pregnancy.[1] A recommended approach for reliable and reproducible criteria for diagnosing ectopic pregnancy includes all of the following[2]:

1. Use of transvaginal USS probe at 5–12 MHz
2. Visualisation of an empty uterine cavity as well as an empty endocervical canal
3. Detection of the placenta and/or gestational sac embedded in the hysterotomy scar
4. In early gestations (less than eight weeks) a triangular gestational sac that fills the niche of the scar – in later gestations (after eight weeks) this shape may become round or oval
5. A thin (1–3mm) or absent myometrial layer between the gestational sac and the bladder
6. A closed and empty endocervical canal
7. The presence of embryonic/fetal pole and/or yolk sac with or without fetal cardiac activity
8. The presence of a prominent vascular pattern at or in the area of a hysterotomy scar in the presence of a positive pregnancy test.

Optimal treatment

Cases of first trimester scar ectopic pregnancies are increasingly reported worldwide. Although no consensus has been reached as to the optimal treatment, several medical and surgical approaches are considered to be safe and effective, including those options that preserve fertility. There are a wide variety of primary approaches, including: intragestational methotrexate, KCl, or vasopressin; hysterosopic resection or D&C with or without adjunctive therapy, such as methotrexate; uterine artery embolisation or etoposide; and wedge resection via laparotomy.[2]

Cases in the second trimester are less common, and may be owing to late patient presentation or difficulty in establishing the diagnosis. As such, there is a comparative paucity of case reports to guide the choice of treatments at this gestation. Although some case series have reported conservative management with hysterotomy or D&C with or without pre-operative methotrexate or uterine artery embolisation[3,4] the rates of postoperative haemorrhage were high, and subsequent emergency hysterectomy often required.[4] This has led some centres to recommend expedient laparotomy and hysterectomy as first-line definitive treatment following appropriate workup and counselling.[5]

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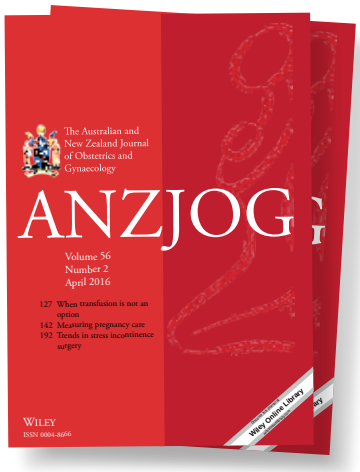
Statement from the Editorial Board: The objectives of ANZJOG July 2016

The Australian and New Zealand Journal of Obstetrics and Gynaecology

ANZJOG

- We intend that ANZJOG will be a high quality academic journal with the main objective of publishing original research from both established and emerging researchers working in obstetrics, gynaecology and related areas. ANZJOG will also publish comment from practitioners in these fields.

- We anticipate that most ANZJOG readers will be obstetricians and gynaecologists who practice in Australia and New Zealand and nearby countries of Asia and Oceania. Other interested readers may be general practitioners, midwives, women's health nurses and Indigenous health workers, as well as non-clinical scientists, epidemiologists and policy makers. Thus while submission is open to all we expect that most papers published will originate in these regions.



- We believe that ANZJOG should be accessible to clinicians across the spectrum of obstetrics and gynaecology. On occasion ANZJOG will publish papers with a primarily subspecialist slant, however such papers would normally have broad appeal amongst the readership of ANZJOG, including obstetricians and gynaecologists with general interests.

- In addition to Original Articles ANZJOG will publish high-quality expert reviews of topics of current interest in obstetrics, gynaecology and women's health; editorials commenting on current practice and research; and other articles including opinion pieces that are well referenced and which contribute meaningfully to the intellectual debate within the specialty. In general, opinion pieces expressing a particular view will be balanced by the publication of a second piece reflecting a differing viewpoint.

- Letters to the Editor on topics in previously published articles will be encouraged.

- There will be six issues annually, each of around 100 pages.

- All original research and other articles will be available online on EarlyView as soon as the proof reading and correction process has been finalised.

- A turnaround time of six weeks or less from reception of submissions to first decision* should be the norm for the majority of submissions.

- At all times the Editorial Board should be composed of members representing the full range of practice within the specialty of obstetrics and gynaecology.

*Acceptance, revision or rejection

Simulation training: the NZ perspective

Dr Sarah Fitzgibbon
MBChB, PGDipObstMedGyn
Advanced FRANZCOG Trainee, AGES Trainee
Middlemore Hospital

Dr Doug Barclay
MBBS, MA, MRCOG, FRANZCOG, Post Grad TLHP
O&G Specialist
Middlemore Hospital

Over the past decade, traditional methods for acquiring surgical acumen have been challenged at multiple levels. Environmental changes involving fewer 'hands on' training hours and increased trainees within the workforce, combined with the development of novel nonsurgical therapies, have all seen our exposure to surgery throughout the training years, and beyond, decrease.

The historic cornerstone of surgical training, 'see one, do one, teach one', is no longer an appropriate model in an environment where 'hands on' time is at a premium. Furthermore, it is well established that laparoscopy is associated with a prolonged learning curve where the technical skills required are fundamentally different from open surgery. With minimal-access techniques now becoming the gold standard in many major gynaecological procedures, surgical simulation opportunities are fast becoming a training necessity.

Simulation is defined as 'an educational technique to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive manner'.[1] It allows a safe and standardised method of surgical training in a calm, well-controlled environment where the patient is no longer the training commodity. One can acquire and consolidate these basic fine motor skills prior to that first step into the operating theatre.

Simulation recognises and addresses that errors are an integral part of human behaviour, performance and development, and indeed surgical learning curves are a very real and sometimes dangerous thing. It goes some way to try and facilitate that initial surgical training experience without unduly exposing patients to the underlying inherent risk.

With the explosion of simulation training across the world, research into its value and validity continues to be produced. A Cochrane review published in 2013 by Nagendran et al[2] summarised the evidence from eight trials looking at the benefits of surgical simulation training in a group of trainees with limited laparoscopic experience. The results showed that when compared to no supplementary training, virtual reality training conferred a higher level of technical accuracy, a reduction in errors, a reduction in the time taken to perform a task, and overall a higher composite operative performance score.

Aggarwal et al[3] undertook a study looking at the learning curve for laparoscopic salpingectomy for the management of ectopic pregnancy using virtual reality simulators. They spilt participants based on prior laparoscopic experience at entry into novice (<10 laparoscopies), intermediate (20–50 laparoscopies) and advanced (>100 laparoscopies), and had them complete a series of ectopic pregnancy simulations over 10 sessions. They showed that while the novice and intermediate group had a steeper and longer learning curve in regards to performance status and time taken to complete the procedure, by the end of the tenth training session, the groups all reached a similar level.

Larsen et al[4] took a group of novice (year 1 and 2) trainees and assessed their ability using a validated performance scale to perform a laparoscopic right salpingectomy in the setting of risk-reduction surgery for BRCA carriers. Half of the group were put through a specific surgical simulation training program with basic skills and procedure-specific tasks. They were only able to perform actual surgery once set proficiency criteria were attained during simulation, with the average time spent on the simulator being seven hours and 15 minutes. When comparing the performance status of the two groups, those who had undergone prior simulation training achieved a performance rating equivalent to that of an intermediate level laparoscopist (defined as experience of 20–50 previous procedures), whereas, unsurprisingly, those with no simulation training achieved performance ratings equivalent to that of a novice laparoscopist (defined as experience of fewer than five prior procedures). They were also able to perform the procedure in half the time (12 versus 24 minutes). This clearly shows that via the use of simulator training, one could effectively bypass the early part of the laparoscopic learning curve.

With the evidence supporting the importance of virtual reality training as a surgical training tool, the next subject of debate is the educational package with which it is delivered. Not dissimilar to other forms of teaching, although laparoscopic simulators can be used independently, the mere availability of a trainer does not necessarily correspond to a surgical training benefit.

Wilson et al[5] recently published on the availability and use of simulation training

Simulated laparoscopy has been shown to effectively bypass the early part of the learning curve.

in New Zealand and Australia. Similarly to data published from surveys of surgical residents overseas, while access to some form of simulation trainer was high (87 per cent), lack of allocated time, lack of supervision, and lack of a formal simulation curriculum were identified as the major barriers to achieving maximal simulation training benefits.

Haerizadeh et al[6] coined the concept of the essential '5 Ws' of simulation training curricula to help guide institutions in setting up simulation training services to avoid the all-too-common scenario of available but underused training facilities (Table 1).

So with all this knowledge to hand, where do we sit with simulation training in New Zealand? Unfortunately, there remains somewhat a postcode lottery with regards to access, support and facilities when it comes to surgical simulation training opportunity. The question remains; with such a wealth of data and evidence that a formal curriculum is necessary, should such training be mandatory? Shetty et al[7] found that integration of simulation-based training in a self-directed fashion remained underused and unsuccessful and that mandatory participation was necessary. A recent survey of New Zealand and Australian trainees found that more than 80 per cent believed simulation was beneficial and should be formally added to the RANZCOG curriculum.[5]

Counties Manukau District Health Board set up a simulation training room in 2011. Funding from the Lion Foundation saw the purchase of two Laparoscopic Simulators (LapSim) and three box trainers. Located in an onsite clinical education centre separate to the clinical department, all new gynaecology trainees are rostered to protected simulation training sessions throughout their placement. The allowance for senior mentorship is included with the presence of a senior surgical educator in the training unit for one half-day session per fortnight. An online anonymous survey of trainees performed after the first year of implementation confirmed that the laparoscopic training program had been well received. Respondents reported an improvement in hand-eye coordination and depth perception, described the training as fun and engrossing, and felt their simulation experience translated to increased confidence in theatre.[8]

Following such local success, and identification that regional variation in opportunity exists, Counties Manukau and RANZCOG New Zealand teamed up to address this problem with the initiation of a basic laparoscopy course for New Zealand RANZCOG trainees. The concept being all year 1 and 2 registrars attend the course as a mandatory requirement, to ensure a minimum exposure to simulation training. The course is run over three days and includes a variety of simulation training tools, with candidates rotated through 40-minute sessions, with a total exposure of approximately six hours on the LapSim, two hours on box trainers, two hours on models, and six hours in a live animal lab. Course numbers include only four trainees, with two mentors, to allow intensive senior feedback with a two to one ratio. Four courses are run per year to cater for 16 trainees annually nationwide.

Now running for three years, approximately 40 trainees have been through. Course feedback evaluation was available for 55 per cent of participants. Responses were unanimously positive, with 100 per cent rating the course overall as five out of five. Furthermore, when comparing the different types of simulation used throughout, all modalities were deemed beneficial, with average scores between 4.3–4.9 out of five.

Clearly, the establishment of this course goes some way to addressing the void in surgical simulation training for our New Zealand trainees. However, with simulation potentially becoming the new cornerstone of early surgical training, continued effort and commitment needs to be made. Formal frameworks need to be developed and delivered in a fashion to allow equal access and opportunity across New Zealand and Australia. Key questions remain unanswered: should simulation training become mandatory or remain a beneficial adjunct where available? Should simulation proficiency assessments in specific surgical tasks be a requirement before being allowed to be the primary operator in real-time theatre? Who is responsible for the

Table 1. The 5 Ws.[6]

Who	Those with minimal expertise at the skills being addressed, as it is the early part of the learning curve that can be bypassed via simulation training
What	The content needs to include basic skills, but also relevant procedure-specific tasks appropriate to the trainee. There needs to be the provision for senior mentorship to provide directed feedback ie a senior surgical colleague present during the training sessions
Where	The location needs to allow uninterrupted training time, while still being accessible to local trainees ie out of the office while remaining on site
When	There should be protected time 'in hours' to allow optimal use of such training facilities, with frequent short sessions of around one hour being most beneficial
Why	To provide an adjunct to our surgical experience, resulting in improved skill acquisition and safer outcomes for our patients

Simulated scenarios can come in many different forms. Here teams compete at SimWars, held at the RANZCOG 2016 ASM, as a learning activity.

development, implementation, monitoring and assessment of simulation training modalities? Who is responsible for the funding required to establish up good-quality facilities?

Moving forward, and we must move forward, these questions need to be answered. We need committed leaders, motivated teachers, receptive trainees, and the underlying drive and buy-in from our key stakeholders, RANZCOG and AGES, who are the governing bodies responsible for O&G specialist and advanced laparoscopic training in Australasia.

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Pregnant Pause: be a hero, take zero

An innovative health campaign is giving the 300 000[1] babies born in Australia each year the best-possible start in life by asking Australians to sign up and wine down.

The National Health and Medical Research Council (NHMRC) alcohol guidelines state that for women who are pregnant or planning a pregnancy, drinking no alcohol is the safest option. However, nine months, or 270 days, can be a long time to go without alcohol. This can be a challenge for mothers-to-be, especially when alcohol and socialising often go hand-in-hand and there's a lot of anecdotal misinformation adding to the confusion.

Pregnant Pause is an initiative of the Foundation for Alcohol Research and Education (FARE), and takes a novel approach to promoting these guidelines. The innovative health-promotion campaign encourages participants to go alcohol free during their pregnancy or the pregnancy of a loved one. The campaign seeks to make it easier on mothers-to-be, by building a strong support system that will help families achieve an alcohol-free pregnancy.

Pregnant Pause reinforces the advice given by health professionals and raises awareness of the various risks associated with alcohol consumption during pregnancy, including miscarriage, still or premature birth, low birth weights, and fetal alcohol spectrum disorders (FASD). FASD is the umbrella term for a range of lifelong conditions characterised by a range of physical, cognitive, intellectual, learning, behavioural, and social problems.[2] FASD are the leading preventable cause of non-genetic, developmental disability in Australia.[3]

Unfortunately, awareness of the effects of alcohol consumption during pregnancy and the recommendation to abstain remains low.[4] Data from the National Drug Strategy Household Survey show 47 per cent of Australian women drink alcohol before discovering they were pregnant, and one-in-five women continue to do so after becoming aware of their pregnancy.[5] Another study showed that 33 per cent of pregnant women reported an intention to engage in drinking behaviours that put both themselves and their offspring at risk.[6]

Pregnant Pause was developed to influence these attitudes and behaviours, in order to reduce and prevent the number of alcohol exposed pregnancies. Research by Health Technology Analysts shows that public education campaigns can prevent between one and three per cent (lower and upper estimates of effectiveness) of cases of FASD each year.[7] Unlike other efforts that focus solely on the expectant mother, Pregnant Pause is a campaign everyone can take part in. The initiative is targeted at the broader community, including those around the woman who can influence her behaviour.

One proven strategy for achieving alcohol-free pregnancies is to strengthen the support network of a mother-to-be. Partners in particular have significant influence, with 77 per cent of women who drink during pregnancy saying that they did so with their partner.[8] About one-third of Australian women would be less likely to drink alcohol during pregnancy if their partner or spouse encouraged them to stop or cut back (38%), or if their partner also stopped drinking alcohol (30%).[9]

It is really helpful if partners, family members and friends show their support for a pregnant loved one by saying, 'we're with you on this and we're going to take a pause from drinking as well'. At its heart, Pregnant Pause is a positive and empowering campaign. This is about encouraging Australians to support each other and give newborn babies the best-possible start in life. It's never too late to cut down or stop drinking alcohol during pregnancy. Even a small change can make a big difference for both mum and baby, ensuring the health of the next generation of children.

If you would like to get involved, there is a range of educational and promotional Pregnant Pause materials available to order free of charge. These posters, flyers and other collateral have everything you need to pass on this important health message

RANZCOG President Prof Steve Robson (centre) with Pregnant Pause ambassadors Kristen Henry and Rod Cuddihy from Canberra's Mix 106.3 breakfast radio crew.

Pregnant Pause ambassadors Kristen and Rod at the Pregnant Pause ACT launch at John James Calvary Hospital maternity ward.

to your patients and other contacts in your network, and can be displayed to show your support and spark important conversations.

For more information about Pregnant Pause visit www.pregnantpause.com.au.

Pregnant Pause is an initiative of the Foundation for Alcohol Research and Education (FARE). The campaign is supported by the Australian Capital Territory (ACT) Government under the ACT Health Promotion Grants Program, and proudly endorsed by health professionals, including the Australian Medical Association ACT branch.

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Yarning about 'that heart problem': RHD in pregnancy

A/Prof Suzanne Belton
Prof Juanita Sherwood
Prof Michael J Peek
Geraldine Vaughan
Prof Elizabeth A Sullivan

Rheumatic heart disease (RHD) is a preventable condition resulting in damage to cardiac valves with added risk in pregnancy. Overall a rare disease, it is prevalent among (particularly remote dwelling) Aboriginal and Torres Strait Islander peoples in Australia. Each year, two to three per cent of Aboriginal women in the Northern Territory (NT) journey through pregnancy with RHD.

During 2012–16, Australian Maternity Outcomes Surveillance System (AMOSS)* conducted population-based research on the pregnancies of women with RHD in 300 maternity units across Australia and New Zealand, and a qualitative study exploring NT women's experiences of RHD. The NT research team walked with eight women as they interacted with health services throughout their pregnancy, birth and the postnatal period.

This is a case study drawn from the experiences of two women who participated in the study. 'Sylvia' is a pseudonym to represent the shared lived experiences of some Aboriginal NT women with RHD during their pregnancy.

The researchers used the yarning methodology to understand the women's experiences and explore how biomedical phenomena impacted on their lives.[1]

Sylvia

Sylvia is a 22-year-old Aboriginal primiparous woman living remotely, about 600 km from an NT regional centre. She speaks two Indigenous languages and English as a third language. Sylvia lives with her mother-in-law and more than 10 other adults and children in a three-bedroom house. This is a typical remote community in that it has extremely limited access to fresh food, specialised health services, schooling and employment opportunities. The community health centre has a high staff turnover and a resident medical officer visits every four weeks.

Sylvia is a heavy smoker. Early in pregnancy, she developed a persistent cough. At 18 weeks, the resident medical officer detected a heart murmur and referred her for cardiac review. However, the four-monthly visiting echocardiogram service had just occurred, so it was 14 weeks before Sylvia had an ECG. By this stage, she was 32 weeks pregnant and very unwell. The doctors decided to fly her immediately to the regional referral hospital.

Sylvia's story

Sylvia arrived at hospital very breathless. Severe RHD with pulmonary oedema was diagnosed and she was commenced on frusemide, beta blockers and LABicillin injections ('secondary prophylaxis' every 21–28 days to prevent a recurrence of rheumatic fever [RF]). She was propped up in bed with pillows and given oxygen. A nurse arrived to provide information about RHD. She stood next to Sylvia, and used a mixture of medical jargon and metaphors: heart valves are 'doors'; streptococcus is a 'bug'. During the 30-minute consultation, Sylvia leant forward, struggling to breathe and her eyes were closed. The nurse left behind an information brochure about RHD, written in English. Sylvia is illiterate.

After four days, Sylvia was discharged, but was advised by her doctor to stay in town at the government-funded hostel. Sylvia's mum and partner, Steven, joined her. The hostel was basic. Meals lacked nutrition, there was no air-conditioning despite the extreme humidity of the Dalirrgang (the build-up to the rainy season), no kitchen to prepare food, no activities or educational opportunities and the rooms were overcrowded. It was a 30-minute walk to the nearest bus stop and a $25 taxi fare to the shops. The women played cards; they were bored. Gangs of youths from nearby housing estates intimidated the women, 'humbugging' them for money to buy food and drugs.

Understanding Sylvia's heart

The research team met with Sylvia, her mum and her partner at the hostel, and talked with Sylvia about her experience.

Sylvia said: 'My feet have been swollen for a few weeks. My heart was beating fast. I had to get an x-ray of my chest. (She moved her hand to her chest, upset.) I didn't know what was wrong with my heart – they didn't tell me. I had a kidney problem when I was a baby. Now I have RHD. But I don't really know what that means. A lady tried to explain it to me but I don't know what that needle [LABicillin] does. I don't feel breathless now because I take my tablets.'

Sylvia's mum described why Sylvia is sick: 'Because the blood and the water didn't really go in through the valve to her heart. You can't stop RHD because of, ah, like, sometime Aboriginal people get White People's sickness. Her heart didn't pump properly. You know, like, if that's what is wrong with her leg, everything is swelling up, because of that, um – I think she's got a fluid. She only had that, ah, kidney problem. Not really a heart problem but now she's got that, um, heart problem. She has exactly the same like her Aunty.'

Sylvia's partner, Steven, commented: 'Yeah yeah. Like you can get that from generation to generation, passing it down. It's in our family.'

Bush tucker and meat pies

Sylvia was very hungry. She ate the meat pie that the hostel had heated up for lunch. Fish, iron-rich wallaby and bush food/medicine are brought to pregnant mums back home, but that was not possible for Sylvia here in the regional centre.

Sit down time, waiting for baby

Sylvia was booked for a routine antenatal visit at the hospital in the regional centre. She was woken at 6am and driven to the hospital without breakfast. She waited in the clinic. It was full of pregnant women and their children. Most were Indigenous. There was no health information that she could understand and she chatted with distant relatives and neighbours to pass the time. At 10 am, a doctor called her name. By then she was really hungry. Her Basics card (to buy food) was back home in the community.

In a firm voice the doctor said: 'The community can't manage your heart problems. You are to stay here until the baby is born', which was in about five weeks. The doctor made no eye contact with Sylvia.

This meant Sylvia would give birth away from Country. Sylvia was silent and then sighed. She wiped her eyes and murmured quietly: 'That a long time nine weeks, long time. I don't feel sick. I don't feel sick back home. Yeah, because of that bush medicine. Yeah, and I got my grandmother like, cook for a person when they're sick. With the medicine from the tree, yeah.'

Sylvia's heart medications ran out. She could not read the pieces of paper that the hospital had given her, but knew it was important to take the medicine. It was a week until her next antenatal appointment. Sylvia waited.

Having baby and returning home

At 38 weeks' gestation, Sylvia had an emergency caesarean as a result of her heart failure and gave birth to a baby boy. She had a postpartum haemorrhage requiring a blood transfusion.

The research team visited her after the birth. Sylvia was distressed: 'I have to go home by myself. The police came and took him (partner Steven) to the station, he is in trouble. He missed court.' Sylvia sobbed.

As Sylvia went into labour, Steven was arrested and jailed for assaulting her earlier in the pregnancy. This serious assault was documented in the case notes, but no health staff had discussed it with Sylvia or made a safety plan for her and the baby.

One week after the birth, Sylvia was flown home. The discharge summary was sent to the wrong community, Sylvia's medications were not provided and no postnatal recall appointments were set up. The primary healthcare team was not aware she had arrived home. Her next LABicillin secondary prophylaxis injection was late.
Back home, Sylvia was breastfeeding her baby. She was surrounded by aunties and cousins who played with him. He had big eyes and snuggled into his mum. He had crusted scabies on his feet and legs.

Desired outcomes

The authors hope that this study will add to the growing literature around culturally appropriate healthcare services and health education for Aboriginal women living in remote regions of Australia who are using cardiac and maternal health services to manage their RHD, and more fundamentally, eradicate this preventable disease.

Further reading

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True/False statements

1. Rheumatic heart disease (RHD) is a common congenital heart condition that is equally prevalent in all levels of society and in all geographical areas.
   False: RHD is a serious complication of acute rheumatic fever (ARF), where a Group A streptococcal (GAS) bacterial infection (upper respiratory tract /skin) leads to acute illness with fever, polyarthritis, carditis and chorea. Recurrent episodes of ARF usually lead to RHD, which damages heart valves and reduces cardiac function. RHD was prevalent in developed countries until 50 years ago, when improved living conditions, medical care and antibiotics resulted in a strong decline in its incidence. Although ARF and RHD have virtually disappeared from the affluent Australia and New Zealand population, Aboriginal and Torres Strait Islanders (particularly remote dwelling) and Maori and Pacific Islander peoples have among the highest documented rates of RHD in the world. It is a disease of overcrowding, poverty and inequity.

2. Sylvia has had ARF in the past; she should understand the causes and consequences of RHD.
   False: ARF/RHD may have been explained to her and her mother but she did not have ongoing LABicillin secondary prophylaxis that prevents RHD. Despite her history of ARF, Sylvia was only diagnosed with RHD in the third trimester – with attendant serious cardiac burden and risk. There were no appropriate health-promotion resources that she could understand or relate to, no interpreter service and she did not understand the Western biomedical cause of her disease. She linked her history of kidney disease (another condition disproportionate among Aboriginal peoples) with RHD. Health information was given to Sylvia when she was severely ill and during a time of crisis. There were missed opportunities for health education while she waited in town or at the antenatal clinic. Health promotion strategies need to draw on Indigenous expertise in developing and delivering appropriate resources.

3. Health services need to consider psycho-social needs rather than just medical needs to improve patient outcomes.
   True: Other needs to be considered include safe housing; food security; appropriate translator/interpreter support; referral to a social worker or appropriate professional Indigenous service for domestic violence; and assistance with orientating to the town and travel. In Sylvia's case, coordination and communication between the cardiac and the maternity team were poor, given the multiple appointments, and the issue of domestic violence was not addressed.

4. In Sylvia's case there are multiple issues impacting on her care and health outcome that the healthcare team should address.
   True: These include delayed diagnosis of RHD and treatment of heart failure; access to medication; smoking reduction and cessation strategies; isolation from family; lack of properly informed consent with treatment; interpreter assistance; gaps in referral to Aboriginal liaison officers and/or social workers; and risk to the baby of rheumatic fever/RHD. There were several gaps in Sylvia's care, including inadequate history and awareness by health services of the importance of the escalated risk and burden of RHD in pregnancy; inadequate access to cardiac (and other) services; errors in information transfer; and poor access to patient transport services.

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*** AMOSS: Australian Maternity Outcomes Surveillance System**

The Australian Maternity Outcomes Surveillance System (AMOSS) RHD in pregnancy study was funded under a National Health and Medical Research Council (#1024206) project grant 2012–16. Principal Investigator is Prof Elizabeth Sullivan. Administering institution is University of Technology Sydney. There were many stories, and we gratefully acknowledge the women and their families who permitted us access to their lives, health professionals who allowed us to observe interactions, supporting organisations (NT Health, AMOSS participating sites, Aboriginal Medical Services), the RHD in pregnancy Advisory Group and many others.

Investigators and project team

Investigators. Chief: Prof Elizabeth Sullivan, Principal Investigator AMOSS and Assistant DVC (Research)/Professor of Public Health, University of Technology Sydney, NSW; Prof Lisa Jackson Pulver, ProVice Chancellor Engagement and Aboriginal and Torres Strait Islander Leadership, Western Sydney University, NSW; Prof Jonathan Carapetis, Director, Telethon Kids Institute, Perth, WA; Dr Warren Walsh, Cardiologist, University of New South Wales and Prince of Wales Hospital, NSW; Prof Michael Peek, Associate Dean, Department of Obstetrics and Gynaecology, Medical School, College of Medicine, Biology and Environment, The Australian National University and Centenary Hospital for Women and Children, ACT; Dr Claire McLintock, Obstetric physician and haematologist, National Women's Health, Auckland City Hospital New Zealand; Prof Sue Kruske, Regional Manager, Maternal and Child Health Institute for Urban Indigenous Health, Queensland and Adjunct Professor, School of Nursing and Midwifery, University of Queensland; A/Prof Suzanne Belton, Senior Research Fellow, Menzies School of Health Research, Darwin, NT.

Associate: Prof Alex Brown, Indigenous Health Theme Leader, South Australian Health & Medical Research Institute (SAHMRI); Prof Elizabeth Comino, Senior Researcher, Centre for Primary Health Care and Equity, University of New South Wales; Ms Heather D'Antoine, Assistant Director Aboriginal Programs, Menzies School of Health Research; Dr Simon Kane, Obstetrician, Lyell McEwin Hospital, Adelaide, SA, Charles Darwin University, NT; Dr Bo Remenyi, Paediatric cardiologist, Royal Darwin Hospital and NT Cardiac Services; Prof Juanita Sherwood, Academic Director, National Centre for Cultural Competency, University of Sydney, NSW; Dr Sujatha Thomas, Staff Specialist obstetrics, Royal Darwin Hospital, NT; Ms Geraldine Vaughan, Faculty of Health, University of Technology Sydney, NSW.

Project team. Ms Geraldine Vaughan, National Coordinator, Faculty of Health, University of Technology Sydney, NSW; Ms Kylie Tune, Northern Territory Coordinator, Menzies School of Health Research, NT; Ms Donna Lorenz, Research Assistant; Ms Krystal Matthews, Research Assistant; Ms Quitaysha Thomas, Research Assistant; Ms Karen Wilson, Research Assistant; Ms Claire Callaghan, Research Assistant, Menzies School of Health Research, NT.

FROM THE EDITOR'S DESK

At the time of writing, the October issue of *ANZJOG* has just appeared and the December issue is in preparation.

October kicks off with a thoughtful and timely editorial from Dr Clare Boothroyd[1] on the question of single embryo transfer in IVF, referring to a paper by Miller et al (Single embryo transfer for all?)[2] later in the issue, and a Letter to the Editor from Newitt et al (Has the twin rate after in vitro fertilisation really decreased in Australia).[3] Further on the topic of twins, among the Original Articles, is a paper from Hehir et al on gestational hypertensive disease in twin pregnancy, from the large national cohort study into twin pregnancies recently conducted in Ireland.[4]

The October issue also sees the first of what it is hoped with be a regular series of Current Controversies in Obstetrics and Gynaecology. From Prof Peter Dietz and Dr Lynda Exton we have an opinion piece entitled 'Natural childbirth ideology is endangering women and babies' in which the authors argue that caesarean section rates should not be used as measures of the success of pregnancy care.[5] Taking a differing view, Profs David Ellwood and Jeremy Oats state that 'Every caesarean section should count', pointing to the short-, medium- and long-term consequences of caesarean birth.[6] Both are excellent papers and firmly evidence-based, representing the two sides of this ongoing and contentious argument in our discipline. The two sets of authors have a right of reply which will be published in the December issue of *ANZJOG*; I also look forward to some robust Letters to the Editor on these topics. Current Controversies will appear in the February, June and October issues of *ANZJOG* with the author replies in the intervening issues. Suggestions for further controversial topics will be welcomed by the Editor.

Breech birth is further explored in an article from Bin et al comparing outcomes of breech birth by mode of delivery.[7] This population linkage study showed that, among women considered eligible for vaginal breech birth, there were higher rates of neonatal morbidity than among women undergoing planned caesarean section, thereby adding considerably to evidence on this topic. Other obstetric research articles deal with the at-times conflicting advice, given by healthcare professionals to women who have undergone either caesarean section or hysterectomy, about when they can return to driving (Shand et al[8]) and the knowledge of a cohort of New Zealand women about nutrition and physical activity during pregnancy (Okesene-Gafa et al[9]).

Among the original articles in Gynaecology, Wilson et al look at the degree to which RANZCOG trainees across Australia and New Zealand are supported in simulation training in surgery in the course of their clinical rotations. They report that, despite recognition of the importance of simulation training for the increasing numbers of trainees, and the availability of simulation in teaching hospitals, few hospitals provide simulation training curricula, allocated time or supervision for their trainees – gaps which need to be addressed urgently.[10] Other original articles demonstrate the efficacy of local anaesthetic instilled into the uterine cavity for pain relief following hysteroscopy of fast track surgery for selected gynaecological oncology patients and of tension-free vaginal tape procedures in conjunction with repair of pelvic organ prolapse.[11-13] In the section devoted to Sexual and Reproductive Health, Newton et al explore the reasons women make decisions about surgical or medical termination of pregnancy, and the authors call for wider availability of medical termination.[14]

The December issue carries an interesting research/opinion paper from Tremellen and Everingham, about the knowledge and views of Australians around access to gestational surrogacy; they argue strongly for well-regulated compensated surrogacy in Australia to reduce the need for Australians to travel overseas.[15] There are also more than a dozen original research papers that I will mention in my next *O&G Magazine* column and which will provide you with Christmas reading.

It is with great pleasure that we publish in the December issue the list of names of all those who have acted as reviewers in the period October 2015 to October 2016. In the past year we have had 332 reviewers, a significant increase on the 272 of the previous year. I am extremely grateful to all of you who have given your time and expertise to reviewing for the Journal – we could not publish *ANZJOG* without your input. We are always looking for more reviewers though, so if you are interested please contact Sarah Ortenzio at anzjog@ranzcog.edu.au. There is no need to be an academic or to have a vast knowledge of statistics to review – many papers simply require the eager eye of an experienced clinician.

I would also like to thank Sarah Ortenzio, the Periodical Publications Coordinator, who does a fantastic job in the day-to-day running of *ANZJOG* and is always ready to

Prof Caroline de Costa
FRANZCOG
Editor-in-Chief
ANZJOG

deal with unexpected glitches. It has been a pleasure to work with Sarah in my first year as *ANZJOG* Editor.

Season's greetings to all.

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Social Media: friend or foe?
Nastashjia Katu, Communications Coordinator, helps us navigate this brave new world

When it comes to social media, it is common for individuals to approach the phenomenon with some scepticism. Platforms such as Twitter, Instagram and even Facebook are often viewed as millennial movements responsible for the popularity of the selfie, #hashtags and OTT (over the top) sharing. This raises the question: can science and research benefit from a social media presence? In short, the answer is yes and here are three reasons why.

1. The online space can be viewed as a place where people go to communicate, gather information and share ideas. As of August 2016, there were 15 million Facebook users, five million Instagram users and close to three million active Twitter accounts. These figures continue to grow each year. If there is one thing that is undeniable about social media, it is the fact that a large proportion of the Australian and New Zealand population use this medium of communication, including scientists, researchers, academic institutions as well as those interested in scientific research. Online audiences are a large and important group to capture.
2. One of the most useful features is the ability to engage directly with audiences. While functionality may differ between platforms, most have developed specific algorithms to allow users to target particular populations and interest groups. Hashtags serve as 'postmarks' allowing comments to be easily searched and categorised. A clever hashtag has the potential to generate a trending topic and is a great tool for driving attention or discussion; #AUSPOL is a good example of this. In addition to target groups and hashtags, tagging is a simple way to ensure a particular person or organisation is notified of your post. Most major media outlets and journalists have an online presence and tagging can be useful for alerting the media to new research.
3. It's instant and, for the most part, free. It provides the opportunity to share information as it happens and how it happens. Almost all platforms render text, images, video and audio extremely well, allowing for versatile and visually engaging content.

While social media is not perfect and can be risky, the opportunity to broaden reach is one of its most attractive qualities. Users are provided with the flexibility to increase engagement through a combination of communication mechanisms. The potential to increase awareness of research and scientific endeavours is reason enough to jump on the social media bandwagon.

Journal Club

Had time to read the latest journals? Catch up on some recent research by reading these mini-reviews by Dr Brett Daniels.

Paracetamol in labour

The choices for relief in labour are many and varied, ranging from non-pharmacological techniques, including massage, relaxation, warm water and TENS machines, to opiate analgesics delivered by various routes, inhaled nitrous oxide or regional anaesthesia. Each method has its own profile of effectiveness in pain relief, acceptability, side effects for mother and baby, and the limitations imposed by cost, staffing and equipment availability. At this stage there is no single technique that is universally accepted as being best and women and their clinicians will generally choose according to their own preferences and local practices.

Paracetamol is a simple, cheap and common analgesic that is acceptable to many women and is not thought to have adverse on fetal well-being if given in labour. This small, but well-designed, placebo controlled single blind study examines the effectiveness of 1000 mg intravenous paracetamol (acetaminophen) as an intrapartum analgesic. Two hundred women in active labour were randomly allocated to receive either 1000 mg of IV paracetamol, or an IV normal saline placebo. They were asked to rate their pain on a visual analogue scale prior to the injection, and at 1, 2, 3 and 4 hours after administration. Women in both the placebo and paracetamol groups showed a significant decrease in their pain rating following injection compared to their initial rating; the paracetamol group showed a significantly greater decrease in pain than the placebo group. There was no significant difference in duration of labour, mode of delivery or fatal outcome between the two groups.

1. Zutshi V, Rani K, Marwah S, Patel M. 2016. Efficacy of Intravenous Infusion of Acetaminophen for Intrapartum Analgesia. *J Clin Diagn Res.* 10:18-21.

HRT use in Australia

Following the release of the Women's Health Initiative in 2002, there was a 55 per cent decrease in the number of Australian women taking menopausal hormone replacement therapy (HRT) by 2005. According to the authors of this study, there has been no publication of the prevalence of HRT use in menopausal women in Australia since the National Health Survey of 2004–05. In addition to addressing the lack of data since 2005, the authors also sought to determine the number of women using bioidentical HRT, which generally uses plant-derived progesterone and oestrogens, often in an individualised dose in a troche or cream.

This study reports on a cross-sectional sample of 4389 women aged 50–69 who received a questionnaire regarding HRT use, menopause and other health and demographic data. Women were randomly selected for invitation into the study from the Australian Medicare database. Of the total sample, 38 per cent had ever used HRT with 13 per cent currently using it at the time of the study. This is similar to the rate reported in 2005; 19 per cent of women had used HRT for less than a total of five years, while 17 per cent using it for longer than five years. The most common types of HRT used were systemic oestrogen (13%), combined oestrogen and progesterone (5%), tibolone (3%), other including topical oestrogen (4%) and 14 per cent were unable to recall the type of HRT they had used. Eight per cent of the women surveyed had ever used bioidentical HRT and two per cent were using it at the time of the study. One interesting result was that, in women with an intact uterus, systemic oestrogen-only HRT was used in 20 per cent of these women, second only to combined oestrogen and progesterone, a surprising result given the association between unopposed oestrogen and endometrial cancer. The authors concluded that the rate of HRT use in women in Australia has remained stable over the last 10 years.

1. Velentzis LS, Banks E, Sitas F, et al. Use of menopausal hormone therapy and bioidentical hormone therapy in Australian women 50 to 69 years of age: Results of a national, cross-sectional study. *PLOS ONE*. 2016; doi: 10.1371/journal.pone.0146494.

Letter to the editor

Dame Margaret Sparrow DNZM MBE
FRANZCOG(Hon)

Dr Doris Gordon: a flawed legacy

Prof Ronald Jones opened his eulogy[1] to Dr Doris Gordon (1890–1956) with the bold statement, 'It could be argued that Doris Gordon has made a greater contribution to the health and welfare of New Zealand women and children than any other individual.' Yes, Dr Doris (as she was usually called) did much to improve obstetrics but it could also be argued that by opposing contraception and abortion on medical, moral, racist and pronatalist grounds she also did great harm. Progress on these essential matters of reproductive health was delayed by many decades, at least in part, because of her negative influence.

In her 1937 book *Gentlemen of the Jury*[2] she wrote: 'Birth-control information, which was meant to benefit the few, has become a way of escape from duty for the majority. Individually and collectively the best elements of civilization are hastening to exterminate themselves with their new-found knowledge. It is not the purpose of this book to maintain that birth control is at all times wrong. There are times and occasions when it is right and justifiable. It is worth remembering, however that the abuse of birth control knowledge in New Zealand has already reduced this country to a dangerous state of stagnation and, coupled with the rising tide of abortions, threatens in a very few years to extinguish its white people.' She was not alone in espousing racist and eugenicist views.

In an appendix to the book, the Dean of Otago University Medical School, Sir H Lindo Ferguson, and the Professor of Obstetrics, JB Dawson, wrote with authoritarian arrogance:[3] 'The problem was by no means limited to New Zealand but is one concerning most of the peoples of our Western civilization. Hitler in Germany and Mussolini in Italy are both alarmed at the declining birth rate of those countries and have inaugurated crusades against contraception and abortion.'

Doris's opposition to birth control was not due to lack of knowledge. She knew enough to advocate birth control when she considered it medically necessary, but recommended it be provided in a restricted way through doctors and hospital clinics (although none were established). Her strong Christian beliefs and missionary zeal conveniently aligned with the prevailing ultraconservative views of the medical establishment regarding contraception and abortion, but it is underestimating her intelligence to say she merely reflected contemporary views. She could be opinionated, and was not afraid to challenge orthodoxy, e.g. she differed from her colleagues in recommending female sterilisation after multiple pregnancies affecting the health of the woman.

She denigrated the efforts of birth control promoters elsewhere to prevent unplanned pregnancies and unsafe abortions. Margaret Sanger (1879–1966) opened the first birth control clinic in the USA in 1916. In 1921, she founded the American Birth Control League, the precursor of today's Planned Parenthood Federation of America. Doris would have been well aware of her leadership in this field.

In England, Dr Marie Stopes (1880–1958), not a medical doctor, wrote her 1918 best seller *Married Love*. Some countries (including Australia) banned it, but New Zealand did not. Marie Stopes's second book, *Wise Parenthood*, published later that year, dispensed more detailed advice on contraception for married couples. In 1923, she published *Contraception Its Theory, History and Practice: A Manual for the Medical and Legal Profession*. Doris disapproved of 'mechanical devices' and the widespread use of preventives, especially by single men and women. She wrote disparagingly of Marie Stopes[4] and asserted her birth control propaganda had tragic repercussions. Worst result of all, she said, there crept into feminine psychology the thought, 'If it is not wrong to prevent it, is it wrong to abort it?'.

Ettie Rout (1877–1936), Australia and New Zealand's sexual health pioneer, who campaigned for venereal disease prophylaxis in First World War troops, was the type of emancipated woman Doris decried. Although Doris was able to combine family life and a career because of a supportive husband, she criticised emancipation in others. In her own words,[5] 'Franchise, Freedom and Babies do not harmonise …There is only one calling in

which modern Woman has failed – a calling in which poor despised grandmother succeeded – the task of keeping the cradles reasonably full … We applaud women's emancipation but only to the degree that Woman can never outwit her destiny. Motherhood is the one true sense in which she is both the servant and the warden of humanity.' Doris considered emancipation the fundamental reason for the high number of abortions.

While Doris's contemporaries Margaret Sanger, Marie Stopes and Ettie Rout were forward thinking regarding contraception, none favoured abortion, largely because of the safety risks in those pre-antibiotic days. It is not surprising that Doris publicly and vehemently opposed abortion, but she could be accused of duplicity because she was known to help women who, in her opinion, were deserving cases. The accepted medical convention was that 'therapeutic abortions' were only possible when pregnancy posed a serious risk to the woman's health. Such medical dominance in decision-making was typical of Doris's domineering manner. To modern feminists, this is no longer acceptable, negating, as it does, the autonomy and decision-making ability of women. Regrettably, the attitudes of the 20th century persist in New Zealand's abortion laws.

Prof Jones correctly describes *Gentlemen of the Jury* as a controversial polemic about the problem of illegal abortion. Her co-author, Dr Francis Bennett, later distanced himself from the publication writing in his autobiography:[6] 'She [Doris] once wrote a lengthy denunciation of the abortionist and sent it to me for literary criticism. I thought it was awful and wrote and said so. She then appeared guest-like on my doorstep and was taken in. All the spare time of the next week was spent in literary conference. It was a hopeless collaboration. She amended the text behind my back. I did the same to her. Eventually we sent it to Professor Dawson. It came back, reduced to half and red-pencilled on every page. It next went to the advertising firm in Wellington which was going to publish it. Here it was re-written by a member of the staff. In its published form it was a very bad book.'

Any discussion of birth control, abortion and eugenics highlights the dilemma of criticising past contributors for their inability to disengage from prevailing establishment views. Prof Jones does not mention Doris's support of the eugenics movement which was fashionable with many intellectuals at the time (including Margaret Sanger, Marie Stopes and Ettie Rout). In the light of modern thinking the eugenic arguments are specious.

Prof Jones is to be congratulated for untangling the web surrounding the defunct Doris Gordon Memorial Trust and enlisting the support of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) and National Council of Women of New Zealand (NCWNZ) in the formation of a new trust to access the available funds. Establishing an annual Doris Gordon memorial lecture, striking a new Doris Gordon medal and awarding this and an honorarium to the lecturer are more contentious. As an energetic, articulate and influential woman, Doris is respected for her significant contributions, but in bestowing a prestigious honour, a higher than usual standard of critical appraisal and due diligence is warranted, indeed expected. Indisputably offensive beliefs cannot be selectively dismissed as having no bearing on her legacy. In glorifying Doris, RANZCOG and NCWNZ are subtly endorsing some of her negative attitudes. Past prejudices are still apparent in the discrepancies between the health of Maori and Pakeha women.

Prof Jones could have mentioned that a memorial to the New Zealand Obstetrical and Gynaecological Society remains today as the Postgraduate Scholarship in Obstetrics and Gynaecology administered by the Faculty of Medicine, University of Otago. The origin of this scholarship dates back to funds gifted in 1931 to the University of Otago for the New Zealand Obstetric Travelling Scholarship. With the establishment of training by RANZCOG, the scholarship was amended in 2004 and again in 2014 to remove the restriction on part-time study. The scholarship is open to College Members or Fellows or Registrars undertaking the Integrated Training Program (ITP). Valued at $25,000, plus tuition fees up to $9000, it is primarily to assist recipients to carry out research while enrolled in a higher research degree.

By choosing not to honour one particular person (as no doubt many were involved), by amending the constitution and allowing the scholarship to evolve with changing circumstances, the University of Otago has demonstrated it is possible to be flexible while still honouring the intent of the original donors, the New Zealand Obstetrical and Gynaecological Society.

In defence of Doris, noone is perfect. She was a product of her time. However the wrongs of the past cannot be glibly dismissed. Memorialising and venerating only part of her legacy is a distortion of reality. Historically, Doris's attitudes, and those of many of her contemporaries, have contributed to our present day racism, sexism and the entrenched stigma surrounding abortion. It is important that this is acknowledged, although it may take some negotiating given that the trust deed states that the founding work of Doris Gordon must be considered when dispersing funds.[7]

RANZCOG and NCWNZ must demonstrate to their members, and to the public, that these valuable funds from another era are used prudently for the benefit of all aspects of women's health. It is an opportunity to show true leadership in meeting the challenges of the 21st century.

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Keeping mothers safe in Papua New Guinea

Emma Macdonald
Send Hope Not Flowers

Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Diplomate Barry Kirby came to medicine through an unconventional pathway. A former chippie who had been building houses in Papua New Guinea (PNG), Barry succumbed to a long-suppressed desire to study medicine at the age of 40 after providing aid to an ill woman who later died.

At the age of 52, Barry returned to PNG, a freshly-minted doctor with his DRANZCOG. Many challenges face the women of remote Milne Bay Province where he provides obstetric services, and his chippie skills often still come in handy.

The rate of maternal death in PNG is estimated to be more than one in every 30 across a lifetime, and these tragic losses are caused by many contributing factors. Dr Kirby is on the frontline of combating them, one by one. He tries to address all the issues that might prevent women from going to their closest health centre – where a supervised birth can mean the difference between life and death.

Women don't seek skilled care for birth for many reasons. There may be no place to stay while waiting for the baby to come – no running water, toilets or even lighting at health centres. Staffing issues and dilapidated labour wards, with no reliable pathways to medivac a mother in trouble, raise hurdles in convincing pregnant women they will have a better outcome away from their home village.

Barry Kirby's Safe Motherhood Program, coordinated by Australian maternal health charity Send Hope Not Flowers and with financial the backing of the Australian Government through its Direct Aid Program, is a new and holistic approach.

The program is being extended to Pumani, Agaun, Ikara and Suau health centres in the Milne Bay Province. These health centres are the most isolated clinics in area and have been largely neglected because of their extreme isolation. Pumani, Agaun and Ikara are only accessible by air or trekking in and Suau is accessible by sea.

Dr Kirby reminds us that attempts to reduce the extraordinary maternal death rate, 'must include intervention outside the normal scope of our medical intervention to be effective.' A recent working bee at the Pumani Health Centre on the North Coast of Milne Bay showed how this unstoppable Australian doctor was required to undertake works beyond the skill set of many.

He oversaw a massive construction, renovation and scavenging program to build a mothers' waiting house, a four-bedroom facility







Top (L to R): Pumani Health Centre (PHC); The mothers' waiting house; Aerial view of Pumani. Bottom (L to R): The construction team built the mothers' waiting house in 12 days using traditional methods; Removing the water tanks for cleaning; Repairing the ward labour beds; Painting the PHC.

AVAILABLE NOW

RANZCOG PATIENT INFORMATION PAMPHLETS

New RANZCOG Patient Information Pamphlets have recently been released and are now available for use.

Created to provide support both to clinicians and their patients, the new pamphlets are a comprehensive and relevant source of patient-focused information that is in-date and aligned with your College statements and guidelines.

The pamphlets have been written by your colleagues who are experts in their fields. They have been developed to provide an efficient adjunct in providing your patients with information and answers to their questions, and can assist clinicians with the informed consent process.

Consumers can view the pamphlets on the College website and receive accurate, reliable information and avoid the pitfalls of popular commercial search engines and website forums.

Pamphlets can be ordered through a dedicated print store portal with College members using their existing RANZCOG member number and registered email address to receive additional benefits including reduced pricing and co-branding options.

Additional topics are continuing to be developed and will be published on the website as they become available. For more information contact womenshealth@ranzcog.edu.au

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

Excellence in Women's Health





Top (L to R): A community talk on hygiene; Neonatal resuscitation training; Training staff in planning a family and spacing of children using Jadell implant for women. Bottom (L to R): A 'mother and baby gift' presented to the first woman to give birth at the PHC; Using a stretcher to carry patients to the PHC.

constructed in traditional style – with round saplings for framing with a sago leaf roof, bamboo walls and floor – by a group of dedicated workers in just 12 days.

The bush material waiting house cost just A$700. The houses are cool and comfortable in the hottest tropical climate for the 'long-distance' mums, and last seven to ten years without maintenance.

It's a small amount of money to provide a little safety and comfort for women in the final days of their pregnancy. The program also provides a per diem for mothers to purchase market food while they are at the waiting house.

Mortality rates have mostly gone unrecorded and, until Dr Kirby's trip to Pumani, there was no running water or lights in the health centre. The first thing Dr Kirby did before he even started his training and clinical work was to clean, renovate and repair the health centre. Ceilings were replaced, walls painted, beds repaired.

The remoteness of Pumani is extremely difficult for the health clinic staff. Until now, there had been no option to medivac mothers out who were facing difficulties.

This soon changed after Dr Kirby arrived. He worked with the locals to make stretchers to carry patients. He found an abandoned airstrip that no plane had landed on in 20 years and engaged 50 local workmen to clear the airstrip and make it fit for an aircraft to land so aero-medical evacuations could take place.

With one of the highest maternal mortality rates in the world, it is this holistic approach to reducing maternal mortality – the practical incentives and the medical interventions – that is going to create and sustain change in these regions of PNG.

Proving that old chippies never lose their touch, Dr Kirby did some hands-on restoration of decrepit water tanks that had been left to rot. With the help of villagers, he split the tanks apart and cleaned them, repaired them, then scavenged an old down pipe from the roof to fit into the tank. The first drops of running water in a decade soon came to the centre.

Elsewhere Dr Kirby's incredible 'mother and baby gift' incentive continues to be extended to new areas. Mothers who present for a birth at a health centre receive basic supplies for themselves and for babies. It is a simple and low-cost initiative – again funded by Send Hope Not Flowers – which tackles entrenched village birth culture head-on and gives mothers a reason to make the journey to her nearest health centre.

Mothers are far less likely to die in childbirth when trained health centre staff are on hand. One Australian doctor's desire to think outside the box, combined with grit and determination, is without doubt having a major positive impact on the lives of mothers and babies in PNG.

Emma Macdonald is a Walkley-award winning journalist and co-founder of Send Hope Not Flowers.

RANZCOG National Trainee Selection Process

Lyn Johnson
Education Director
RANZCOG

The Selection Committee continues to review and refine the RANZCOG Trainee Selection process, which has become increasingly competitive as medical school placements and postgraduate numbers have increased. For the past few years, the College has received a minimum of three-times the number of applicants than available training positions. Inevitably, this means that very good candidates miss out on selection causing not only disappointment to the candidates themselves but also to those Fellows and members who support them in their endeavours to obtain a place on the FRANZCOG Training Program.

Finding the right method or tools to ensure the right candidates are selected for training is challenging; all medical schools and specialist colleges grapple with this issue. RANZCOG has recently trialled and/or implemented several initiatives to assist in this process and to address training needs and workforce shortages in regional and rural Australia.

In 2015 and 2016, the College introduced changes to some of the processes including:

- measures to address the issue of high transfer requests from some locations
- limiting the number of regions/states for which candidates can apply
- limiting the overall number of times candidates can apply
- the approval of three Provincial Integrated Training Programs (PITPs)
- the introduction of institutional references, including hospital ranking and recommendation, to assist the shortlisting process
- piloting of situational judgement tests (SJTs) as a potential shortlisting tool.

At the November 2016 meeting, the Selection Committee reviewed this year's processes, including feedback received, before making their final recommendations to the Board for the 2017 process.

Applications

The RANZCOG Trainee Selection Process is applicable in both New Zealand and Australia. The New Zealand selection process commences in February and is completed by the end of May, to allow trainees to begin their training year at the start of December. The Australian selection process opens in April and is completed in August, ready for the training year which starts in February of the following year.

In New Zealand, all shortlisted candidates are interviewed in Wellington over two days for all positions in all regions. In Australia, all shortlisted candidates are interviewed on the one day in the state of their first preference. In 2015 and 2016, interviews were held in Brisbane, Sydney, Melbourne, Hobart, Adelaide and Perth.

In recognition of increasing numbers of Integrated Training Program (ITP) transfer requests in previous years from certain locations, the Selection Committee introduced a separate preference phase for the newly approved Provincial ITPs as well as for Canberra, Newcastle and Tasmania. Shortlisted applicants for these ITPs were interviewed on the same day by the same panels with additional relevant questions for those applying for the PITPs. Applicants successful in being offered one of these ITPs, accept the offer with full knowledge that transfer requests to other ITPs will not be considered in subsequent years.

In addition to the individual ITP preferences outlined above, applicants are able to preference up to three states in which they would be happy to train. Applicants who list only one state because they are not willing and/or able to move interstate, can limit their selection chances if they are not highly ranked; however, they are less likely to spend the next few years trying to return to their state of first preference. In 2016, all but two candidates were offered their state of first choice in Australia.

The rule restricting the number of applications has also been introduced. From 2016, applicants are permitted to apply for the FRANZCOG Training Program a maximum of three times. This cap has not been retrospectively applied, so that 2016 marks the 'first' application by all candidates.

Establishment of a provincial training pathway

The College recently established a PITP for RANZCOG Core Training in an effort to attract those medical practitioners who have a demonstrated commitment to rural health, to be able to undertake their specialist O&G training and pursue a career in a regional area. The first PITP trainee commenced in February 2015 at Dubbo, the second at Orange in 2016, and one trainee will commence at Dubbo and one at Mackay in 2017. Trainees undertaking a provincial pathway are required to spend three out of their four years of core training at the accredited provincial site(s) and their remaining year in a major metropolitan teaching hospital. The selection process follows the standard process with the addition of a supplementary application that uses additional selection criteria which are shown to increase the likelihood of long-term practice in provincial areas.

Shortlisting

The selection process involves ranking of all applicants. Shortlisting for interview has traditionally been based on the scores received for the CV/Application and Referee Reports (equally weighted) and final selection has been based on the scores received for the CV/Application, Referee Reports and the interview (weighted as 25 per cent, 25 per cent and 50 per cent, respectively).

It has been acknowledged that the current process of shortlisting for interview, using only the CV and the applicant-nominated referees, has failed to adequately discriminate, leading to applicants who may have been considered highly suitable for interview and training missing out by very small margins. This is understandable given the number of applications received, the high calibre of applicants, and that scoring and weightings are published on the website as required by the Australian Medical Council.

While publication of a scoring system increases transparency, it also means that applicants work hard to gain the maximum marks in categories such as presentations, publications, attending relevant courses, experience as an unaccredited O&G registrar and so forth, which further reduces discrimination on the CV/application component. The individual referee reports have also failed to discriminate well. In 2015 and 2016, approximately 80 per cent of applicants received 85 per cent or greater for their total score for this component.

With an aim to better discriminate and assist the shortlisting process, the Selection Committee introduced Hospital Ranking or Institutional References (IR) as an additional component to the 2015 and 2016 selection process. As past performance is considered to be a good predictor of future performance, hospitals are well placed to distinguish between applicants on the basis of how they actually perform in the workplace. To this end, hospitals were asked to recommend and rank applicants on their comparative relative merit, knowing the applicants' surgical aptitude and professional attributes and behaviours. The IRs were used in conjunction with the ranking obtained from the CV/application and applicant-nominated references to assist with the shortlisting process.

All hospitals where an applicant had completed 10 weeks or more in a prevocational O&G position at their hospital in the previous two years, were asked to rank the applicant in terms of their suitability for the FRANZCOG Training Program. The College asked that the consensus ranking be completed by the relevant hospital ITP Coordinator/Training Supervisor/Head of O&G, after discussion with and input from a range of O&G consultants and/or senior registrars. Although high ranking by a hospital translated into an increased chance of being shortlisted for many preferred candidates, it did not guarantee selection onto the training program as scoring from the interview, CV/application and individual referees all contribute to the published process.

Interviews

Regional Training Accreditation Committees increased their panel numbers for 2015 and 2016, which enabled the College to shortlist and interview approximately two-thirds of the total number of applicants in both years. However, as the numbers of postgraduate doctors move through the system and compete for places on the training program, the College is unlikely to be able to accommodate any higher numbers at interview; hence the need to investigate other tools, methods or processes that will assist in selecting the best candidates with the resources available.

SJTs

The College piloted SJTs with all shortlisted applicants in New Zealand and Australia in 2015, and with all applicants in 2016. SJTs are designed to assess an individual's judgement regarding situations encountered in the workplace. Applicants are presented with a set of hypothetical basic work-based scenarios and asked to make judgements on possible responses. Applicant responses are evaluated against a predetermined scoring key to provide a picture of their situational judgment in that particular context. An individual SJT question can assess several attributes per scenario, such as interpersonal and communication skills, problem solving and teamwork, empathy and professional integrity, clinical reasoning and coping with pressure. In longitudinal studies, SJTs have been shown to have a high correlation with OSCE performance and are therefore used for their predictive ability.

The College engaged the World Psychology Group (WPG) to oversee both pilots as they have extensive experience in the field of selection and evaluation, and in particular in the design and evaluation of SJTs in high-stake settings, both here and overseas. The results from the pilots did not contribute to the scoring for the 2015 or 2016 selection process. However, the psychometric analysis that was conducted following both allocation processes will be considered by the Selection Committee at the November 2016 meeting to help inform any recommendations regarding their future use.

We are very cognisant of, and grateful to, the many College Fellows and senior trainees who give their time and expertise to various aspects of the selection process – from assisting applicants with their CV/applications, providing guidance for mini research projects, holding practice interview sessions, completing references, contributing to IRs, writing and/or reviewing scenarios for the SJT questions, volunteering to sit the SJT under test conditions to ensure concordance with the question reviewers, interviewing shortlisted applicants in state-based panels, and finally in counselling applicants who may miss out because of the highly competitive field. Almost every hospital has excellent potential trainees, so it is inevitable and unfortunate that some will miss out despite the efforts, refinements and tools adopted. The College is considering how hospital knowledge and feedback about potential new trainees can be further incorporated into the selection process. Feedback is always welcome.

Notice of Deceased Fellows

The College was saddened to learn of the death of the following RANZCOG Fellows:

Dr Kenneth John Little, ACT, on 16 January 2015
Dr Stafford Northcote Maclennan, Qld, May 2015
Dr Christopher Harmston, Qld, 13 January 2016
Dr Michael Joseph Simcock, NSW, 12 August 2016

RANZCOG Foundation Research Scholarships and Fellowships in 2017

The RANZCOG Foundation offered a number of scholarships for application this year for research commencing in 2017. The process for evaluating scholarship applications aims to identify promising early-career researchers and the RANZCOG Research Grants Committee, which assesses these applications, was very impressed with the high quality of applications received. The RANZCOG Foundation is pleased to present the following summary of recipients and research being conducted in 2017.

Glyn White Research Fellowship, 2017–18

Recipient: Dr Kirsten Palmer
Institution: Monash University
Project: 'Targeting placental specific sFLT-1: enhancing the prediction and diagnosis of pre-eclampsia'

Dr Palmer is a FRANZCOG trainee, an O&G Senior Registrar at Monash Medical Centre/Monash Health, a Lecturer at Monash University and Honorary Lecturer at the University of Melbourne. Dr Palmer's project will assess a new test that holds promise in its ability to accurately predict or diagnose pre-eclampsia. If successful, this test could then be used globally to improve the prediction and/or diagnosis of pre-eclampsia, with the goal of improving outcomes for women and their babies.

Mary Elizabeth Courier Research Scholarship, 2017–18

Recipient: Dr Rachael Rodgers
Institution: University of New South Wales
Project: 'The administration of anti-Mullerian hormone to protect the ovaries during chemotherapy'

Dr Rodgers is a final year FRANZCOG trainee, currently undertaking first year CREI subspeciality training, and Fertility Fellow at the Royal Hospital for Women, Sydney. Using mice, Dr Rodgers' research project investigates whether the concurrent administration of anti-Mullerian hormone during chemotherapy will reduce the degree of damage to the ovarian reserve. As long-term cancer survival rates increase, fertility preservation is a very important issue to a large number of young premenopausal women diagnosed with cancer each year.

Norman Beischer Clinical Research Scholarship, 2017–18

Recipient: Dr Monica Zen
Institution: Westmead Hospital
Project: 'The impacts of kidney disease in pregnancy'

Dr Zen is a FRANZCOG trainee/O&G Senior Registrar at Westmead and secondment hospitals and enrolled as a PhD candidate at the University of Sydney. As part of Dr Zen's research, a Cochrane Systematic Review of proteinuria in pregnancy and its role in predicting and diagnosing adverse pregnancy outcome will be performed. In addition, a cohort study will be conducted to assess the diagnostic and prognostic performance of dipstick urinalysis versus urinary albumin to creatinine ratio versus urinary protein to creatinine ratio in the diagnosis and prediction of adverse pregnancy outcome in a cohort of high-risk obstetric patients, namely women with diabetes.

Luke Proposch Perinatal Research Scholarship, 2017

Recipient: Dr Thomas Cade
Institution: Royal Women's Hospital, Melbourne
Project: 'New criteria for the diagnosis of gestational diabetes: a maternal and neonatal health outcome and economic analysis in a large tertiary level maternity centre'

Dr Cade is Head of Diabetes and a Consultant Obstetrician/Gynaecologist at the Royal Women's Hospital, Melbourne. Dr Cade, a RANZCOG Fellow, has been awarded the Luke Proposch Perinatal Research Scholarship for his project that aims to determine if the new diagnostic criteria for gestational diabetes result in better maternal and neonatal outcomes and if the change is economically beneficial to public health.

RANZCOG Fellows' Clinical Research Scholarship, 2017

Recipient: Dr Tanya Nippita
Institution: Kolling Institute, Royal North Shore Hospital
Project: 'Probiotics for women with preterm prelabour rupture of membranes (PPROM) to delay preterm birth: a randomised controlled trial'

Dr Nippita, a RANZCOG Fellow, is a Staff Specialist, Obstetrics and Gynaecology, at Royal North Shore Hospital, and Perinatal Women's Health Lecturer at Sydney Medical School-Northern, the University of Sydney. Dr Nippita has been awarded the RANZCOG Fellows' Clinical Research Scholarship for her project that will endeavour to determine whether the addition of a probiotic to standard management of women with PPROM <34 weeks gestation will delay the onset of labour and birth and improve neonatal outcomes. Dr Nippita's project also seeks to determine the microbiota of the uterus and preterm infant after PPROM and acceptability of probiotics by pregnant women at risk of preterm delivery.

Taylor Hammond Research Scholarship, 2017

Recipient: Dr Charlotte Oyston
Institution: University of Auckland
Project: 'The placental transcriptome in severe early onset fetal growth restriction: effect of sildenafil citrate'

Dr Oyston is a FRANZCOG trainee and PhD candidate at the University of Auckland. Dr Oyston's project aims to improve the knowledge of mechanisms underlying severe early onset fetal growth restriction (FGR), and the mechanisms through which sildenafil may improve fetal growth by using a genome-wide method of expression analysis of placental samples collected from women in a clinical trial. The findings have the potential to help inform clinical practice. For example, the findings may provide insight as to the optimal time for treatment initiation of sildenafil or suggest specific subtypes of FGR where maximal benefit would be obtained with treatment.

RANZCOG NSW Regional Committee Trainee Research Grant, 2017

Recipient: Dr Sarika Gupta
Institution: University of Sydney
Project: 'Investigating the impact of community contraceptive implant provision on maternal morbidity and mortality on Karkar Island, PNG'

Dr Gupta is a FRANZCOG trainee and PhD candidate at the University of Sydney, Faculty of Medicine-Sydney Medical School. Dr Gupta's study aims to investigate the impact of contraceptive implants on maternal health in rural communities in Papua New Guinea by comparing specific health statistics pre and post introduction of the implant devices. The study also aims to understand how contraceptive implants are perceived and accepted by rural communities in Papua New Guinea and to identify any potential social and cultural barriers that may prevent ongoing use of the implants.

RANZCOG NSW Regional Committee Trainee Research Grant, 2017

Recipient: Dr Jason Phung
Institution: Hunter Medical Research Institute
Project: 'Understanding myometrial transition in term and preterm labour to guide tocolysis'

Dr Phung is a FRANZCOG trainee and accredited registrar in Obstetrics and Gynaecology at Liverpool Hospital/South Western Sydney Local Health District. Dr Phung is currently undertaking a Masters of Public Health and plans to commence a PhD at the University of Newcastle in 2017. Dr Phung has been awarded a RANZCOG NSW Regional Committee Trainee Research Grant to undertake research to study the pathway to labour, which genes are responsible for the initiation of uterine contractions, and how we can use them to identify new therapeutic targets to halt preterm labour. A better understanding of the pathway to labour may also improve induction of labour and treatment of PPH.

UroGynaecological Society of Australasia (UGSA) Research Scholarship, 2017

Recipient: Dr Lin Li Ow
Institution: Monash Health
Project: 'Mini-sling or Retropubic sling in women with Intrinsic Sphincter Deficiency: a RCT study (Mini RISD)'

Dr Ow is a RANZCOG Fellow, Urogynaecology subspecialty trainee and Urogynaecology Fellow, Monash Health. The primary aim of Dr Ow's project is to assess the objective cure rate (negative clinical cough stress test) of the mini-sling against the retropubic sling at six months postsurgical treatment of female urodynamic stress incontinence and intrinsic sphincter deficiency (USI/ISD). The project could demonstrate that the minimally invasive sling can potentially be used in women with SUI associated with ISD with a potential for reduced risk of complication (bladder perforation, voiding dysfunction, bowel injury) and a reduced risk of overactive bladder symptoms and pain, compared to the retropubic approach.

ASGO International Travelling Fellowship, 2017

Recipient: Dr Nirmala Kampan
Institution: The Royal Women's Hospital, Melbourne

Dr Kampan is an Associate Professor at the Universiti Kebangsaan Malaysia Medical Centre, Malaysia and PhD candidate, Monash University. Dr Kampan has been awarded an ASGO International Travelling Fellowship to allow her to travel to the Royal Women's Hospital, Melbourne in July/August 2017 to undertake a placement in the Gynae/Oncology Unit. Dr Kampan's visit will include exposure to medical oncology clinics, gynae-oncology operations, observation of ongoing clinical trials and participation in multidisciplinary team meetings and activities, as well as presentations and conduct of teaching and audit sessions.

SCHOLARSHIPS CONTINUING IN 2017

Fotheringham Research Scholarship, 2016–17

Recipient: Dr Ryan Hodges
Institution: The Ritchie Centre, Hudson Institute, Monash University
Project: 'Fetal therapy for congenital diaphragmatic hernia: a global partnership to translate surgical and cellular innovation'

Dr Hodges' project, which is testing the hypothesis that human amnion epithelial cells (hAECs), when administered antenatally to fetuses with congenital diaphragmatic hernia (CDH), can reduce lung hypoplasia and abnormal pulmonary vasculature that leads to pulmonary hypertension, by promoting tissue regeneration and repair in utero, will continue to be funded in 2017. Dr Hodges believes the findings will extend to other fetal lung pathologies, for example, oligohydramnios-related pulmonary hypoplasia, the devastating consequence of early preterm prelabour rupture of membranes and preterm birth.

RANZCOG/OvCan (ACT & Region) Ovarian Cancer Awareness/Support Scholarship, 2016

Recipient: Dr Noor Lokman
Institution: University of Adelaide
Project: 'Targeting hyaluronan to overcome chemoresistance in ovarian cancer'

Dr Lokman's research will investigate the potential clinical use of HA as a serum biomarker for early detection of relapse in ovarian cancer patients after chemotherapy treatment (months 1–4). The clinical use of HA inhibitor, 4-MU will be investigated in comparison to carboplatin using established ovarian cancer models (months 5–9). The study will evaluate whether 4-MU is effective to increase the cytotoxic effect of carboplatin to overcome platinum resistance.

DONATIONS

The RANZCOG Foundation is very grateful to all those who have continued to support its philanthropic work. Donations to the RANZCOG Foundation, from individuals as well as organisations, enable the College to not only support clinical and scientific research, but also initiatives in Indigenous women's health and women's health in developing countries and the development and preservation of the College's historical collection. RANZCOG members are able to donate to the RANZCOG Foundation via the payments section of the MY.RANZCOG portal. To log in and donate, please visit https://my.ranzcog.edu.au/login.

Donation Enquiries

Please contact the RANZCOG Foundation Coordinator, Jennifer Keating on +61 3 9412 2993 or jkeating@ranzcog.edu.au.

Recipent of the 2016 Liam and Frankie Davison Award

Nastashjia Katu
Communications Coordinator

Each year, the College presents up to two Liam and Frankie Davison Awards to senior secondary students in Australia and New Zealand for outstanding literary submissions on a women's health topic.

Established in 2014, the literary Award continues to grow in popularity. This year, the College received a total of 22 entries. The Award Committee were impressed with both the quality and range of women's health topics that were addressed. These topics included mental health, fertility, polycystic ovarian syndrome, abortion, women in developing countries and violence against women.

Julia Down of Fintona Girl's School (Victoria) was identified as the clear 2016 Award winner for her excellent submission titled, Virginity: A way of Oppression and Restriction. Julia was presented with a certificate and $1000 prize by CEO, Alana Killen, at a school assembly attended by Julia's teachers, peers and family. The College congratulates Julia for her achievement.

Alana Killen, RANZCOG CEO, presenting Julia Down with the 2016 Liam and Frankie Davison Award.

Obituary

Dr Deborah Margarette Wass
(1953 – 2016)

Dr Deborah Margarette Wass was born in Newcastle on 22 June 1953. She graduated from Sydney University in 1976. After deciding on a career in obstetrics and gynaecology, she set off on a stellar training path, working under every specialist obstetrician and gynaecologist of consequence in London, at Kings College Hospital, Samaritan Hospital and Queen Charlotte's Hospital. Dr Wass became a Fellow of the Royal Australian College of Obstetricians and Gynaecologists (RACOG) in 1985. She worked as a staff specialist for some years at the Royal Hospital for Women, Paddington, New South Wales. During this time she sustained an injury following a fall, which resulted in a chronic neck pain syndrome. This led her to retrain as an ultrasound specialist. During her subspecialty training, she established and honed her skills at transvaginal chorionic villus sampling (CVS) and published a landmark report, '1000 consecutive Transvaginal CVS by a single operator'. In 1991, she was certified in Obstetrical and Gynaecological Ultrasound (COGU).

In 1996 she moved to Albury-Wodonga to become the first COGU subspecialist in regional Australia. Here she served the border town as well as the surrounding centres, including Wangaratta and Wagga Wagga, with a population in excess of 250 000. The move to the country allowed her to develop her passion for breeding and racing horses.

Dr Wass was involved in the supervision and teaching of specialist trainees, which opened the door to the first Senior O&G Registrar training post being formed in a provincial centre, at Wodonga Hospital. She also had a broader influence on the executive of Australasian Society for Ultrasound in Medicine (ASUM) where she was an examiner for the Diploma of Diagnostic Ultrasound (DDU) until her death.

With Dr Wass' considerable intellect, her ability to cut to the chase and her authoritative views on all matters obstetrics and gynaecology, she was an integral member at all departmental meetings and in the day-to-day support of border clinicians.

Dr Wass was universally liked by the many women she cared for. Her style was direct, but always compassionate. She helped an enormous number of women through the pain of failed pregnancies, fetal malformations and many other hurdles of pregnancy.

Dr Wass died suddenly on 23 May 2016, and is survived by her mother Margarette and her sister Jillian.

Dr John Salmon, Vic
FRANZCOG FRCOG DDU

VIEW FROM THE TOP

RANZCOG 2017
ANNUAL SCIENTIFIC MEETING

Skycity Convention Centre
Auckland, New Zealand
29 October to
1 November 2017

SAVE THE DATE

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
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College House 254 – 260 Albert Street East Melbourne VIC 3002 Australia
T +61 3 9417 1699 F +61 3 9419 0672 E ranzcog@ranzcog.edu.au