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CALLING A CODE

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The College

Calling a Code

Women's health

The College

From the President

Prof Steve Robson
President

I am very excited about this Winter issue of *O&G Magazine*. The editorial team have done a fantastic job, as always, of drawing together a highly skilled group of contributors to look at how we respond to emergencies and urgent matters. Our specialty is especially prone to high-stake, emergency situations; it is part of the excitement of the job at times. Protocols change and it is important that we all hone our skills and stay in-date with emergency clinical practice. I am sure you will enjoy this issue just as much as I do. My personal thanks to all of our generous authors for another excellent issue.

Mesh matters

I attended a urogynaecology meeting in the UK last year, and the aftermath of the Scottish Government's 2014 decision to request suspension of the use of transvaginal mesh in the NHS, pending safety investigations. At the time, members of the Scottish Mesh Survivors' campaign told the Government committee of the 'life-changing side effects' they had suffered following mesh surgery. The following year, the Scottish Health Secretary apologised to women who were left in 'severe pain'.

Fellows in New Zealand will be familiar with their own Government Health Select Committee Inquiry into mesh. The recommendations include a nationwide mesh register, and standardised reporting of adverse outcomes. Importantly, the Ministry of Health clearly stated that 'the professional colleges are the most appropriate organisations to take the lead on professional practice matters such as appropriate use of surgical mesh and ensuring patients are informed of the benefits and risks of any treatment.' This has put our College in the key position to guide practice in the area of mesh use in New Zealand, and is a credit to the hard work of New Zealand Fellows.

The Senate Committee is well underway in Australia, and recent media coverage in newspapers such as the *Sydney Morning Herald* has not exactly been reassuring for our patients:

> Pelvic devices developed in Australia from the 1980s and 1990s are at the centre of a global medical scandal that includes regulatory failure, and allegations of research fraud and experimental surgery on women in multiple countries.

The final report of the Scottish Independent Review was released in March, after an exhaustive investigation process, and among its conclusions were:

> Fundamental to the treatment of patients with SUI and POP is patient-centred care which should include patient choice and shared decision making supported by robust clinical governance. To support shared decision making, management of patients must take place in the context of a multidisciplinary team, supported by a quality assurance framework.
>
> The [Review] does not consider that current research studies on safety and effectiveness provide sufficient evidence on long-term impact of mesh surgery.

> The [Review] expressed serious concern that some women who had adverse events felt they were not believed, adding to their distress and increasing the time before any remedial intervention could take place.

When it came to recommendations about mid-urethral tapes and transvaginal mesh, the issues were dealt with separately. Tapes for stress urinary incontinence were addressed first, with cautious support:

> In the case of surgical treatment for SUI, a review of the different sources of evidence has led us to recommend that women must be offered all appropriate treatments (mesh and non-mesh) as well as the information to make informed choices.

However, transvaginal mesh did not fare so well:

> In the surgical treatment of POP, current evidence does not indicate any additional benefit from the use of transvaginal implants (polypropylene mesh or biological graft) over native tissue repair. Transvaginal mesh procedures must not be offered routinely.

The College is developing a submission to the Senate Inquiry, and the Terms of Reference for this inquiry should be of interest to many Fellows in Australia, including:

- The number of women in Australia who have experienced adverse side effects
- Information provided to women prior to surgery about possible complications and side effects
- Any financial or other incentives provided to medical practitioners to use or promote transvaginal mesh implants

By the time you read this column, the College submission to the Senate Inquiry will have been delivered. Indeed, if any Fellow – or other person – would like to make a submission to the Inquiry, you should go to the Senate website and follow the links. As this is an issue of great importance to many Fellows, I will make sure you are aware of all developments as they happen, through *Collegiate* and on the College website.

Private practice

The situations are different in Australia and New Zealand, but a very large proportion of clinical activity in our speciality in Australia occurs in the private sector. Australia has a long history of balance between private and public medicine, with many Fellows and Diplomates, as I do, working across both sectors. Almost one third of births in Australia are in the private system, and more than half of all gynaecological procedures and operations are in private hospitals and day procedure centres. For this reason, the health of the private sector in Australia is of fundamental importance to women.

I have a private obstetrics and gynaecology practice, and understand well the complexities of running the practice and providing good and valued clinical care. In addition to providing care, I have to run the business and try to turn a profit – something that isn't quite so easy with Presidential responsibilities to attend to. There seem to be potential threats on the horizon that make me feel uneasy: changes to the uptake of private health insurance; possible changes to medical indemnity schemes; and, complying with revalidation requirements. Running a private practice is a major challenge, and I am sure that many of my colleagues feel the same way.

I am determined to take a number of steps to address the concerns of many College Fellows and Diplomates about the viability of their private practices. Fellows have been surveyed about how the College could potentially assist those in private practice, and focus groups are

underway. I want to reassure all Fellows that the College supports those in private practice, and I am finding ways of providing practical assistance.

Women at disadvantage

The standards of care we can provide to our patients in Australia and New Zealand are, in many respects, the envy of the world. However, there are many women who face obstacles in accessing the care we can provide. Health outcomes for Aboriginal and Torres Strait Islander women in Australia are a long way from those of non-Indigenous women, and similar problems face Māori women in New Zealand. Migrant and refugee women are at enormous social disadvantage, and this risks their own, and their entire families', health. Close to us, women in Pacific countries and regions such as Timor Leste have little or no access to the standards of healthcare we take for granted.

I am working to engage the College on all of these fronts. I recently spent the morning with the Minister for Indigenous Health here in Canberra, with my fellow college Presidents, and we are determined to do everything possible to close the gap in health outcomes. I continue to Chair the Migrant and Refugee Women's Health Partnership, and this broad group – Government, community groups, and the colleges and AMA – are working towards a community framework to enhance the healthcare of this large group of women. I have also commissioned a strategic review of women's health across the Pacific, to help determine how best the College can support women in our neighbouring Pacific countries.

> "I am pleased to announce that the College will be holding a Women's Health Summit in the first part of 2018."

Engagement

The only way the College can continue to achieve its mission – providing excellence in women's health – is by engaging broadly. Engaging with Fellows, Diplomates, trainees and other members. Engaging with Governments at all levels and across both Australia and New Zealand. Engaging with the community in general, and with women in particular. I believe we are perfectly placed to drive policy development for the betterment of women's health. For this reason, I am pleased to announce that the College will be holding a Women's Health Summit in the first part of 2018. This summit will draw interested parties from across Australia and beyond, with a view to developing a set of policy imperatives that must be addressed by Governments. The College will set the agenda for women's health for the next decade and beyond, ahead of the next Australian Federal election.

As always, I need to thank all those who contribute to the life and activity of the College; the wonderful pro bono workforce who do so much for us, and the College staff for their dedication and expertise. I hope all of you rug up over winter, and I look forward to reporting back to you in spring.

Prof Steve Robson meeting with Dr John Brayley, Chief Medical Officer for the Department of Immigration.

From the CEO

Alana Killen
CEO

Advocacy and engagement

As the leading body for women's health in Australia and New Zealand, RANZCOG takes an active advocacy role through the development of statements and guidelines, by contributing to health policy debate, providing representation on various external committees and advisory groups, and responding to requests for submissions. These activities, undertaken by our representative members on an entirely voluntary basis, provide a critical voice in the women's health discourse and raise the profile of RANZCOG as the 'go to' authority for women's health. As an expert body, the College is able to draw on extensive expertise and evidence when providing advice to various government departments, agencies and other entities, and has become increasingly involved in these activities over the past few years.

In past reports, I have outlined the College's objective of confirming its role as the preeminent authority for women's health in Australia and New Zealand; a crowded space that has become populated with a plethora of well-informed and less-informed 'experts'. The media, particularly social media, has become the de-facto handbook for many women's health issues and the College is frequently called upon to provide an authoritative and evidence-based opinion within an often noisy debate. RANZCOG holds a unique position in this paradigm as a non-partisan and objective body whose primary goal is to promote and support women's health; it is not reliant on external funding and can maintain its independence.

A consensus-based approach

One of the challenges of being a membership organisation that advocates for a cause is the ability to reach consensus on matters of importance. Evidence-based guidelines are expensive to develop and require significant resources to produce. The statements produced by the College are done so on a consensus basis and involve extensive discussion, refinement and multiple drafts. It is almost impossible to develop a statement with which everyone agrees; however, the process is undertaken with mutual respect for professional expertise and opinion and is implemented in a rigorous and comprehensive manner.

More recently, the development of statements, submissions and responses has been considered through the lens of engagement and inclusiveness. Further enhancements to the manner in which these documents are produced are being examined to ascertain how more of our members may be able to contribute to the process. There is a significant body of knowledge existing within the College that is not always accessed and we are now contemplating strategies for tapping into this expertise. By taking

an inclusive approach to the development of these resources, RANZCOG will have access to a much deeper pool of knowledge which will, in turn, enhance the quality of the finished product. We will keep you apprised of progress in this area and the manner in which you may be able to contribute your views and opinions in the development of RANZCOG statements and other documents.

O&G workforce

In 2012, Health Workforce Australia produced a report titled 'Health Workforce 2025' that provided projected supply and demand figures for doctors and nurses, including the medical specialities. At that time, there was a predicted shortfall of obstetricians and gynaecologists, despite the increase in medical student intake and ongoing numbers of international specialists entering the workforce. The modelling is currently being further refined to take into account productivity and economic factors as well as changes to demographics due to the increase of women entering the profession, retirement numbers and changing patterns of work.

The increased medical student intakes and associated demand for vocational training places has put pressure on the training pipeline as supply has not kept up with demand. These 'bottlenecks' have occurred at various points in the training continuum; interns, specialist training and now there are increasing concerns about numbers of O&G specialists seeking positions once they have obtained their Fellowship. Concerns have also been raised about adequate access to procedures as many tertiary centres remain the primary training site for registrars.

However, despite the apparent over-supply of O&G specialists, predictions are still for a shortfall by 2025 if the current arrangements stay in place. The problem remains that of distribution, or more accurately, mal-distribution; metropolitan areas have reached saturation point and rural and regional areas are suffering ongoing shortages. Strategies and initiatives continue to be developed; the latest, announced by the Australian Government in April, aims to increase rural and regional access to high-quality medical services, including specialist medical care.

RANZCOG acknowledges the concerns of some members regarding future workforce numbers, but also recognises its role in the health workforce planning scenario, which is to provide a well-trained, high-quality O&G workforce that meets the health needs of the community. While the College relies on the jurisdictions to determine numbers of trainees entering the program, each training site must be able to attain the appropriate standard in order to retain its accreditation status. Those sites that are unable to provide adequate training (for example, procedural numbers) will find that their accreditation will be affected. This may lead to a natural attrition regarding numbers of trainees being appointed to large, metropolitan hospitals.

Current initiatives, such as STP funding, which provides funding for training in private settings, and the newly introduced Integrated Rural Training Pipeline for Medicine aims to result in more O&Gs choosing to practise in rural and regional areas. As always, RANZCOG's Provincial Fellows play an important role in supporting and advocating for O&Gs working in these settings.

Regional Scientific Meetings

Speaking of regional settings, two highly successful RANZCOG meetings were held recently: one in Albury, which was a combined meeting of the Provincial Fellows, Victorian and Tasmanian Committees, and the other in the Barossa Valley, hosted by the South Australian/Northern Territory and Western Australian Committees. Both meetings were well attended and included a number of interesting speakers and workshops. Thank you to all those who volunteered their time to facilitate, present and assist with the organisation of these meetings. Thank you also to the staff for all their hard work in preparing for and supporting these events.

By the time you read this, we will be counting down to the Annual Scientific Meeting, which is being held in Auckland this year; I hope you are able to attend and look forward to seeing you in New Zealand.

Editorial

Dr Gillian Gibson
FRANZCOG

Pink, red, blue, green, orange – the colours vary from institution to institution, but an emergency code is universal – notification of an event that requires immediate attention. An emergency code should convey essential information quickly and minimise misunderstanding, differentiating between a maternal collapse on the delivery unit, cardiac arrest on the gynaecology ward or a neonatal emergency.

This issue, 'Calling a code', contains core knowledge about management of obstetric and gynaecological emergencies. Regrettably, without effective teamwork, this will not help you much in a clinical emergency. Emergency drills train practitioners to communicate and function well as a team in a stressful situation. For example, how do you order desperately needed units of blood, ensuring that one individual has been assigned and completed that task?

A key message from the 2016 UK Confidential Enquiry into Maternal Deaths report (MBRRACE-UK) was that 'early recognition of critical illness, prompt involvement of senior clinical staff and authentic multidisciplinary team working, remain the key factors in providing high-quality care to sick mothers'.

The Perinatal Mortality and Morbidity Review Committee (NZ) has likewise recommended all staff should have regular multidisciplinary training to manage obstetric emergencies. Special attention was drawn to the high rate of amniotic fluid embolism (AFE) as cause for maternal death in the latest report (2016). Review suggested improved recognition of AFE in women who collapse and co-ordinated resuscitation of mothers may improve the chance of survival.

PRactical Obstetric MultiProfessional Training (PROMPT) is now a well established course in both New Zealand and Australia. The stated aim is 'improving teamwork in obstetric emergencies, set in your own institution, with obstetric trainees and consultants, anaesthetists and midwifery members of the team practising drills together'. It is all too easy to get drawn into performing a practical task in a crisis and to lose sight of the bigger picture. To regain control, PROMPT teaches and puts into practice strategies, such as declaring an emergency, taking a 'helicopter view', giving clear simple commands and suitable delegation of tasks.

The Advanced Life Support in Obstetrics (ALSO) course aims to impart knowledge and build confidence among obstetric professionals managing emergencies, in a calm and supportive environment, usually away from your place of work.

While the benefits of practical emergency drills are not disputed, the sustainability and integrity of the courses are not assured. Our challenge is to persuade government agencies that this is a worthwhile investment.

Further reading

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Basic resuscitation

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Maternal collapse is an acute event that involves cerebrovascular and cardiorespiratory systems, presenting as reduced or absent conscious levels at any stage in pregnancy, including up to six weeks after delivery. The incidence is approximately 1:20,000–1:30,000 internationally.[1] The uniqueness of this rare event is that there are (at least) two patients – the mother, and the fetus(es). A multidisciplinary approach is necessary to enhance the survival likelihood of all involved patients – including obstetrics, anaesthesia, neonatology and, sometimes, cardiothoracic surgery. The application of early basic life support techniques can greatly improve outcomes, and requires knowledge of the physiological changes of pregnancy.

Cardiovascular

Maternal heart rate and stroke volume both increase, resulting in an increased cardiac output. Blood volume increases by 30–50 per cent, with a 20 per cent increase in red blood cell volume, thus resulting in physiological anaemia. Because of this increased volume, clinical signs are a late indicator of reduced circulating volume. After 20 weeks, supine hypotension also occurs due to aorto-caval compression by the gravid uterus.

Respiratory

Maternal respiratory rate and tidal volume both increase, resulting in an increased minute ventilation. This is in part compensation for the increased oxygen demands of the uterus, placenta and fetus. The gravid uterus and cephalad displacement of the diaphragm (causing a reduced functional residual capacity) also reduces oxygen reserves. Because of this, desaturation and hypoxia occur more quickly than in the non-pregnant patient.

Abdominal / pelvic

There is a marked increased risk of gastric aspiration. This is due to both a decrease in lower oesophageal sphincter tone and an increase in intra-gastric pressure.

The Australian and New Zealand Committee on Resuscitation (ANZCOR) approach to basic life support follows the 'DRABCD' approach (Figure 1).[2] It is always essential to first check for any danger to the responder before checking the pregnant woman for responsiveness, and ensuring adequate help is sought immediately. In the hospital setting this involves ensuring a Code Blue is called and mentioning it is a pregnant patient. Current guidelines are to only move the patient if they are in a hazardous position, to facilitate airway management or to control severe bleeding.

Airway

Management of the airway takes priority over other injuries, including potential spinal injury, or the health of the fetus. To clear the airway, you should open the patient's mouth and turn their head slightly downwards. You should open the airway using a head-tilt/chin-lift manoeuvre. Place one hand on the forehead and the other to provide chin lift. In the unconscious patient, their relaxed muscles and large tongue are likely to create an obstructed airway, even if their mouth is open. It is important to identify airway obstruction early, bearing in mind that it may be partial, or that respiratory effort may be maintained in a patient with an obstructed airway. An airway obstructed with a foreign body in an unconscious patient is managed with up to five back blows followed by up to five chest thrusts.

Breathing

Assessment of breathing is performed next. You look for movement of the chest, listen for

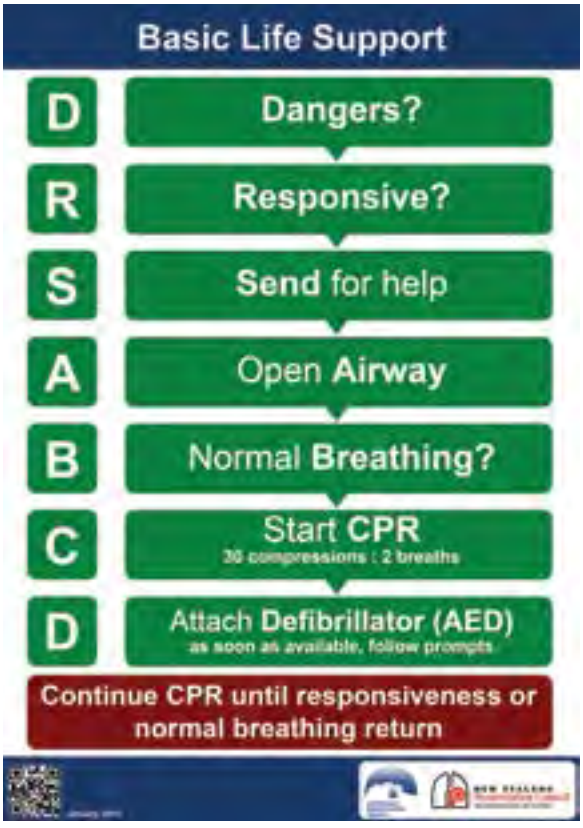

Figure 1. Adult Advanced Life Support, Reproduced with permission from ANZCOR

escape of air from the mouth or nose, and feel for associated movement of air. If the unconscious person is still not breathing normally despite airway opening, it is imperative to immediately begin chest compressions, followed by rescue breathing. Mouth-to-mouth or mouth-to-nose can be used; alternatively, all resuscitation trolleys should have an ambu-bag for ventilation.

Compressions

All patients who are unresponsive and have absent breathing require resuscitation. It is no longer recommended to feel for a pulse. Compressions should be performed at a rate of 100–120 per minute, a ratio of 30:2 breaths, and at approximately one-third of the chest depth, allowing for adequate recoil at the end of each compression.

The pregnant patient

Of note are the differences to the basic life support algorithm for the pregnant woman. While data are scarce, ANZCOR has a consensus statement that follows best available evidence. Good quality, uninterrupted chest compressions are the priority. Once adequate CPR is underway, if resources permit, the woman should have uterine displacement performed. This can be done with a towel or cushion under her right hip, or with manual displacement by another responder.

Defibrillator

Time to defibrillation is a key factor influencing survival. A defibrillator should be applied as quickly as it becomes available so that a shock can be delivered, if warranted. Defibrillators should be used on pregnant women.

This rare and challenging clinical scenario is likely to be chaotic for all involved. Clear communication, early mobilisation of help, and adherence to these protocol algorithms can help us to navigate a stressful situation, and facilitate transition to advanced life support.

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Advanced resuscitation

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This article highlights the key principles of basic resuscitation and approaches some of the more challenging and unusual scenarios we may find ourselves in.

Initiating advanced life support

Attending a resuscitation call in the delivery unit or emergency department is undoubtedly stressful.

Being the first responder to an unconscious patient outside a clinical area, without appropriate equipment or support, can unnerve even the most experienced clinician.

It goes without saying that help should be sought immediately. Be clear who you want (for example, obstetric emergency team), where you are (for example, level 9 obstetric clinic) and what you need (for example, perimortem caesarean section kit). Using the adult advanced life support algorithm (Figure 1) will allow you to focus on a methodical plan in assessing and managing the patient.

Intravenous access should be secured above the diaphragm, as venous compression can hinder the delivery of intravenous drugs to the arterial vasculature. As you apply the basic principles of resuscitation, consider the aetiology of the collapse. The simple aide-memoire of 4Hs and 4Ts (outlined in Figure 1) still holds true, but other obstetric causes, including eclampsia and intracranial haemorrhage, should also be considered.[1] Help should hopefully have arrived during the initial resuscitation, at which point a clear and concise handover should take place. You may decide to allow the anaesthetist to take over while

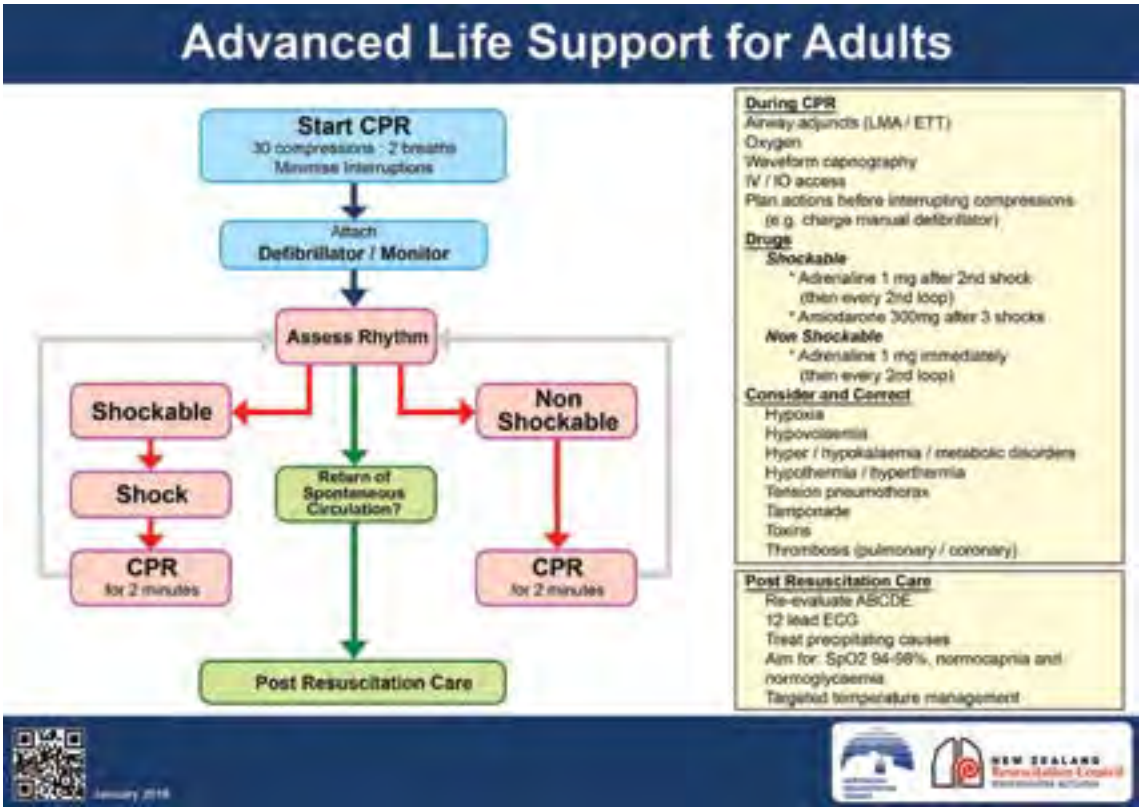

Figure 1. Adult Advanced Life Support, Reproduced with permission from the Australian and New Zealand Committee on Resuscitation (ANZCOR).

you continue resuscitation or devise a surgical plan. Decisive leadership and teamwork are required at this juncture.

Perimortem caesarean section

Perhaps the toughest decision is whether to perform a perimortem caesarean section, and where to do so. Time is the most critical factor when a pregnant woman with a viable fetus arrests, and the Royal College of Obstetricians and Gynaecologists (RCOG) recommends delivery within five minutes of cardiac arrest. Therefore, attempts to transfer the mother to the operating theatre should not occur, as this takes up valuable time. It is crucial to remember that the life of the mother comes first, and the decision to perform a perimortem caesarean section should be in the interests of maternal survival. Resuscitation efforts should continue during preparation for, and throughout delivery of the fetus. Most delivery units and emergency departments have pre-packaged perimortem caesarean section kits that contain essential equipment, including a fixed-blade scalpel, Mayo scissors, clamps and forceps. It is useful to familiarise yourself with the equipment available in your department. Transferring the patient to an appropriate location for continuing treatment and stabilisation should take place once resuscitation is successful, post-delivery.

Intraoperative cardiac arrest

The incidence of cardiac arrest during a surgical procedure is rare (seven in 10,000 surgeries).[2] In this scenario, your role as a surgeon is vital, with clear communication needed across both sides of the surgical barrier. The anaesthetist is typically at the head-end, securing the airway (if not previously done) and providing haemodynamic support. Your ability to stabilise the patient by achieving haemostasis and protecting the surgical field is paramount, but you may also be asked to perform cardiopulmonary resuscitation. The drugs commonly used in a cardiac arrest include adrenaline, amiodarone and magnesium, and are usually found in the cardiac arrest trolley. Every arrest trolley and anaesthetic machine should have a folder containing emergency protocols (such as for anaphylaxis or local anaesthetic toxicity) to provide guidance in these chaotic moments. In exceptional circumstances, the surgery may be aborted to transfer the patient to a safer environment, such as the intensive care unit.

Complications from CO_2 insufflation

Insufflation of carbon dioxide (CO_2) during laparoscopic surgery can induce pathological cardiovascular changes, including bradycardia, arrhythmias and even cardiac arrest. This can be explained via two mechanisms: firstly, the mechanical effect of elevated intra-abdominal pressure, and secondly, the absorption of CO_2 itself.

A profound vagal response to peritoneal distension is often responsible, usually preceded by severe bradycardia. Rapidly releasing the pneumoperitoneum typically reverses this, but the anaesthetist may administer an anticholinergic (atropine or glycopyrrolate) to counter the low heart rate. In susceptible patients, elevated intra-abdominal pressure can reduce venous return and in turn cardiac output, causing cardiovascular collapse. This problem can be further aggravated by the Trendelenburg position. Hypercarbia and acidosis from CO_2 absorption may also trigger arrhythmias.

With a rising population of patients with poor cardiorespiratory function, raised BMI and advanced age, we may see these risk factors increase laparoscopic surgery complications. Minimising intra-abdominal pressures and insufflating the abdomen cautiously can help reduce intra-operative complication rates.

Preparation

Anaesthesia is sometimes described as the specialty of 99 per cent boredom and 1 per cent sheer panic. When a catastrophic event does occur, preparedness for the unexpected is key. Anaesthetists regularly undergo resuscitation training to prepare for that 1 per cent, as there is no substitute for practical experience.

There are various recognised multidisciplinary simulation courses tailored for obstetricians and gynaecologists, including PROMPT, ALSO and MOET. These form an integral part of training, equipping us with tools to build the confidence needed to face challenging scenarios. Hopefully, this article provides you with an understanding of how our specialties can work together to offer our patients the best care possible, in what can sometimes feel like a chaotic environment.

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Trauma during pregnancy

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Trauma during pregnancy is the leading non-obstetric cause for maternal morbidity and mortality, occurring in 8 per cent of all pregnancies.[1] Furthermore, there are significant potential risks to the fetus, including intrauterine fetal demise, fetal injury (traumatic, cerebral palsy), preterm labour, placental abruption and uterine rupture as a result of a maternal injury. Approximately 50 per cent of trauma in pregnancy is due to motor vehicle accidents, while the remainder is the result of domestic/intimate partner violence, falls and burns. While most trauma during pregnancy in Australia relates to blunt trauma, penetrative injury (knife or gunshot wounds) present a greater risk given the gravid uterus is the most likely abdominal organ to be injured, and results in a higher perinatal mortality of up to 70 per cent.[2] Fortunately, major trauma remains relatively uncommon in the experience of most obstetricians. However, it is important to have established clinical skills and protocols for optimal care to improve outcomes for mothers and their babies in the event of trauma.

Primary survey / initial assessment

The first priority always remains the assessment of the woman and treatment of her life-threatening injuries which, in effect, will improve the fetal outcomes. Her initial assessment and resuscitation should be in accordance with the Advanced Trauma Life Support Guidelines (ATLS), with consideration of obtaining an adequate airway, ventilation and haemodynamic stabilisation. Avoidance of hypoxia, hypotension, acidosis and hypothermia in the woman will improve uteroplacental flow and therefore limit further fetal injury.

However, there are additional considerations in pregnancy that need to be addressed when performing a primary survey and in the initial management of the woman:

- It requires an understanding of the altered anatomy and physiology of a pregnant patient that allows better identification of a patient at risk. These changes can mask or mimic injury, potentially resulting in misinterpretation and inappropriate management.
- It is important to position the woman after 20 weeks gestation in left lateral tilt (~30⁰) or alternately manually displace the uterus (possible even with spinal precautions) to prevent aortocaval compression.
- It is important not to withhold medications, treatment, procedures or investigations necessary to treat the mother out of concern for the pregnancy.
- Consider treatment of pregnant trauma patients (especially those after 20 weeks) at a hospital with a combined trauma and obstetric service, if at all possible.
- If in cardiac arrest, it is important that defibrillation and advanced cardiac life support are provided as per a nonpregnant patient, but with consideration of a perimortem caesarean section (if thought to be more than 20 weeks gestation) if there is no effective response to CPR within four minutes, with the aim to delivery by five minutes.

Secondary survey

Once stabilised, secondary evaluation for maternal and fetal injury should occur simultaneously. This begins with a thorough history, including mechanism of trauma, obstetric and antenatal history, and assessment of gestational age, if known. History specific to complications of trauma in a pregnant patient include vaginal bleeding or loss of liquor, abdominal pain or contractions and maternal perception of fetal movements.

Specific considerations on examination include:

- Abdominal palpation to confirm fetal presentation, assessment of uterus for tone, contractions and tenderness, noting that the clinical signs of peritoneal irritation are less pronounced in pregnancy
- Vaginal speculum examination, where indicated, to exclude cervical effacement and dilation, vaginal bleeding and ruptured membranes
- For viable gestations after 24 weeks, a cardiotocography (CTG) should be performed to assess fetal wellbeing and uterine activity

Investigations

Diagnostic radiologic imaging

Clinician and patient concern regarding the risks of ionising radiation are often disproportionate to the actual risk.[3] At radiation doses of <50mGy, there is no increased risk of pregnancy loss, fetal anomalies, growth restriction, intellectual disability or fetal anomalies. In addition, the lifetime carcinogenic effects of in utero ionising radiation exposure are thought to be small (<0.8% for <20mGy, 2% <50mGy).[4] The majority of diagnostic imaging (chest, abdominal, pelvic x-rays, head CT) are associated with fetal doses comfortably below this level, with abdominal and pelvic CT imaging involving a slightly higher fetal radiation dose at approximately 20–35mGy. If diagnostic radiologic imaging is indicated after maternal trauma, it should not be precluded due to concerns about fetal exposure.

Where possible, women should be counselled about the risks of in utero radiation exposure as above, and the risks must be weighed against the potential of identifying or excluding life-threatening injuries with imaging. Greater fetal radiation exposure occurs with direct abdominal/pelvic imaging and the breasts, abdomen and pelvis should be shielded where possible. Ultrasound and MRI can be considered alternatives as they have no adverse fetal effects, though the latter is not routinely used in the acute trauma setting due to extended image acquisition times, especially in the critically unwell patient.

CTG

CTG remains the primary investigation for assessment of fetal wellbeing and uterine activity in women after 24 weeks gestation. Fetal heart rate abnormalities, which occur as a result of compromised fetal perfusion and oxygenation, may be predictive of placental abruption, fetal hypoxic injury and potentially fetal demise, but sensitivity remains at only 62 per cent. However, when combined with a normal physical examination, the negative predictive value is 100 per cent in excluding adverse fetal outcomes.[4]

CTG should be applied as early as possible following primary survey and without delay after maternal stabilisation. The ideal duration of CTG monitoring remains unclear, with current trauma guidelines suggesting between four and 24 hours of observation and monitoring. Several small prospective studies have indicated that in the absence of uterine activity, vaginal loss or abnormalities of the fetal heart pattern, the CTG can be discontinued after four hours without any further adverse obstetric/fetal outcomes over an uninjured patient control group.[5,6]

Kleihauer-Betke test

The Kleihauer-Betke (KB) test is a blood test often used as a routine investigation to identify a fetal-maternal haemorrhage (FMH) that can occur in 10–30 per cent of pregnant women following trauma.[1]

However, the incidence of a positive KB test following maternal trauma has been shown to be no different to the incidence in low-risk pregnant women without a trauma history.[7] This indicates that a positive KB test alone is insufficient to indicate a pathological FMH and the need for delivery. A significant FMH following trauma is usually diagnosed clinically on the basis of CTG changes, antepartum haemorrhage or intrauterine fetal demise, and does not require waiting for a blood test result to indicate need for delivery. The KB test can be useful in calculating the required dose of prophylactic Rh immunoglobulin and is required in Rhesus-negative women following trauma to prevent isoimmunisation from a small nonpathological bleed.

Ultrasound scan

Ultrasound scan (USS) is a valuable tool in assessing pregnant women following trauma to ascertain accurate gestational age, fetal presentation, placental location, estimated fetal size, fetal wellbeing (including evidence of fetal anaemia through middle cerebral artery Dopplers) as well as potential injuries to mother and baby. USS is not a sensitive investigation in the diagnosis of placental abruption, with 50–80 per cent of abruptions missed on scan alone.[4,5] Furthermore, there is currently no evidence to support the use of biophysical profiles to predict adverse obstetric outcomes and need for delivery in the trauma setting.

Conclusion

Trauma in pregnancy requires a multidisciplinary approach, combining the experience of the emergency physicians, trauma surgeons, radiologists, obstetricians and paediatricians, to improve both maternal and fetal outcomes. Maternal resuscitation and investigation of maternal injury remains the primary focus initially, switching to assessment of fetal wellbeing once the mother is stabilised. Clinical examination and fetal heart rate monitoring are the most predictive features in identifying adverse fetal outcomes, with further investigations, including the KB test and ultrasound, providing an adjunctive role.

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Eclampsia and hypertensive emergency in pre-eclampsia

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Eclampsia is defined by the onset of convulsion in the antepartum (after 20 weeks gestation), intrapartum or postpartum period (usually within seven days, but up to a maximum of six weeks postpartum) in association with features of pre-eclampsia. Internationally, eclampsia occurs in 0.6 per cent of all pregnancies and up to 2–3 per cent of women with pre-eclampsia. In Australia, this figure fortunately remains low at 0.1 per cent of all births and 2.6 per cent of those with pre-eclampsia. Eclampsia carries a high risk of mortality (of up to 15 per cent) and morbidity, particularly with cerebrovascular events. The exact pathophysiology of eclampsia is not known, though two models have been proposed based on the role of central hypertension. The first model describes a breakdown of the autoregulatory system of the cerebral circulation, leading to hyper-perfusion, endothelial dysfunction and cerebral pathology such as haemorrhage or oedema. The second model describes an activation of the autoregulatory system leading to vasoconstriction of cerebral vessels and hypo-perfusion. These pathophysiological factors may result in cerebral irritation and eclampsia. The prodromal importance of hyperreflexia and clonus as signs of upper motor neurone irritation from cerebral oedema is recognised in everyday practice.

Can we predict eclampsia?

A systemic review demonstrated that most women who develop eclampsia experience one or more anteceding symptoms in the preceding few hours (Table 1), though up to 25 per cent may be asymptomatic. It is also important to remember that, rarely, features of pre-eclampsia (hypertension and proteinuria) can be absent in some women prior to eclampsia. There is no general agreement on indication for prophylactic magnesium infusion, though the current literature recommends initiating magnesium sulphate in women who present with:

- Systolic blood pressure (SBP) ≥170mmHg or diastolic blood pressure (DBP) ≥110mmHg with 3+ proteinuria
- SBP ≥150 mmHg or DBP ≥100mmHg with 2+ proteinuria in the presence of at least two antecedal signs or symptoms of eclampsia (Table 1)
- Pre-eclampsia with at least one sign of central nervous system irritability (persistent severe headache, visual disturbance, hyperreflexia with sustained clonus of more than three beats)
- The need for transfer to high dependency care unit for the management of pre-eclampsia

Management of eclampsia

There are four key aims in the management of eclampsia and these are further outlined in Figure 1 (overleaf).

Table 1. Antecedal signs and symptoms of eclampsia and frequency observed (based on systemic review).

Antecedal symptoms/signs	%
Hypertension	52
• Mild to moderate (SBP 140–160 mmHg / DBP 90–110mmHg)	20
• Severe (SBP ≥160mmHg, DBP ≥ 110mmHg)	32
Persistent severe headache	66
Visual disturbance (photophobia, scotomata, blurred vision)	27
Right upper quadrant or epigastric pain	25
Asymptomatic	25
Ankle clonus	22

Table 2. Dose and administration of magnesium sulphate.

Loading dose of magnesium sulphate
• 4g IV over 20 minutes **Renal impairment**: 2g IV over 20 minutes in the presence of renal impairment or suspected renal impairment
Maintenance dose of magnesium sulphate
• 1g per hour IV via a controlled infusion device for up to 24 hours after delivery or last seizure. Need for ongoing therapy thereafter should be made based on clinical assessment **Renal impairment:** Reduce dose to 0.5mg per hour and consider four-hourly serum magnesium and hourly urine output monitoring.
Stop magnesium infusion if magnesium toxicity is suspected: • Serum magnesium concentration >3.5mmol/L • Decreased deep tendon reflexes • Respiratory rate < 12 breaths/minute • Reduced urine output <40 ml/hour
Antidote for magnesium, if required: 10% calcium gluconate 10ml IV

Table 3. Commonly used antihypertensive agents for management of severe hypertension.

Anti-hypertensive agent	Onset of action	Dose	Precaution
Labetalol (IV)	5–15 mins	Initial dose: 20mg over two minutes Subsequent dose: 40mg every 10 minutes with maximum of 80mg ** Consider labetalol infusion if target BP is not achieved after three doses. This drug formulation is not readily available in Australia*	Avoid in patients with bradycardia, asthma and congestive cardiac failure
Labetalol (IV) infusion	5–15 mins	Continuous infusion at 1–2mg/min	As above
Hydralazine (IV)	10–20 mins	Initial dose: 5–10mg over five minutes Subsequent dose: 5mg every 20 minutes with a maximum of 30mg ** Consider hydralazine infusion if target BP is not achieved after 3 doses*	Plasma expansion with IV fluid may be required to prevent acute hypotension
Hydralazine (IV) infusion	10–20 mins	Continuous infusion at 5mg/hr with gradual up-titration every 30 minutes Maximum rate of 40mg/hr	As above
Nifedipine (oral) conventional release	10–20 mins	Initial dose: 10mg Subsequent dose: 20mg every 30 minutes to a maximum of 50mg	Avoid when GCS is altered
Diazoxide (IV)	3–5 mins	Initial dose: 15mg as a rapid bolus Subsequent dose: 15mg every 2–3 minutes, with a maximum dose of 300mg	Monitor blood sugar levels

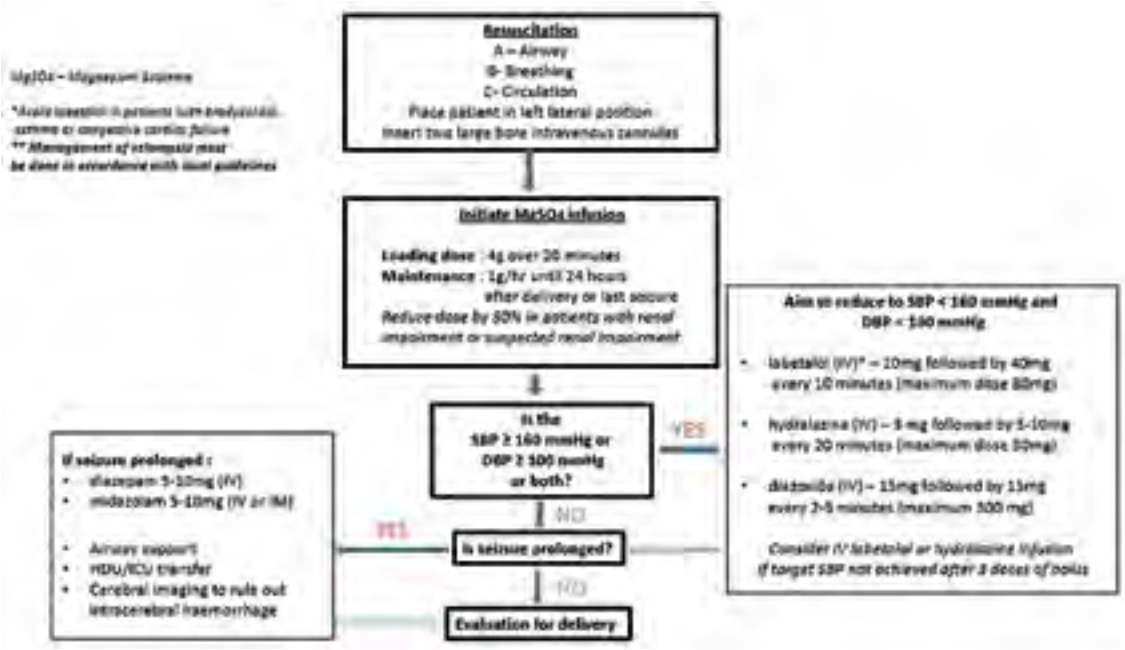

Figure 1. Flowchart summarising management of eclampsia.

Maintenance of maternal airway and prevention of hypoxia

The patient should be placed in a left lateral position to minimise the risk of aspiration with supplemental oxygen at a rate of 8–10L/min administered via a nonrebreather mask. Raise side rails of bed to ensure safety of the patient.

Seizure management and prevention of recurrent seizure

The first eclamptic seizure is usually self-limiting. Intravenous magnesium sulphate should be initiated in patients with eclampsia as a first-line therapy and for prevention of recurrent seizures (Table 2). If intravenous access is not established, magnesium sulphate (4g) or midazolam (5–10mg) can be given intramuscularly in the immediate setting, though access must be subsequently established. If the seizure is prolonged, benzodiazepines may be required (Figure 1). It is important to exercise a great degree of caution with co-administration of magnesium sulphate and benzodiazepines as this increases the risk of respiratory arrest. It is also important to consider the need to transfer the patient to a high dependency unit and for cerebral imaging in the event of prolonged or recurrent seizure. Magnesium sulphate infusion reduces the risk of recurrent seizure in eclamptic patients by 52 per cent and, for this reason, timely initiation of magnesium sulphate infusion is crucial (Table 2). Magnesium sulphate is renally excreted and a dose reduction is required when renal impairment is present or suspected (urine output <40ml/hr, or a rising serum creatinine concentration). The current recommendation suggests that the infusion should be continued for up to 24 hours after delivery or last seizure, or longer if clinically indicated (ongoing headache, visual changes, hyperreflexia, ankle clonus). An additional bolus of 2g of intravenous magnesium sulphate can be administered if seizure reoccurs while on the magnesium sulphate maintenance infusion. Neurology opinion and cerebral imaging should be obtained if seizure continues to reoccur despite this.

Magnesium sulphate toxicity can lead to a decrease or loss of deep tendon reflexes followed by respiratory depression and ultimately respiratory arrest. The current literature does not recommend routine serum magnesium concentration monitoring in women with normal renal function, though a four-hourly biochemical monitoring is required in those with renal impairment. The current monitoring recommendations for women receiving magnesium sulphate infusion are:

- Hourly deep tendon reflex assessment (upper limbs if after epidural/spinal anaesthesia)
- Hourly urine output monitoring
- Continuous pulse oximetry monitoring

Management of severe hypertension

Acute hypertension management is warranted if SBP ≥160mmHg or DBP ≥100mmHg or both. This is crucial in the prevention of cerebrovascular events, which account for 20–30 per cent of the morbidity and mortality of eclampsia.

It is important to reduce the blood pressure without compromising maternal cerebral perfusion pressure and uteroplacental blood flow. The aim of initial intervention is to reduce SBP to ≤160mmHg and DBP to ≤100mmHg. Intravenous antihypertensive agents are often used in this setting due to the need for rapid onset of action. The agents commonly used are labetalol, hydralazine or diazoxide (Table 3). Selection of the medication should be based on the availability, potential side effects and the clinician's and caring team's familiarity. A more detailed description of these medications is provided under the subheading 'Hypertensive emergencies in pre-eclampsia'.

Evaluation for delivery

While delivery is the definite treatment of eclampsia, eclampsia is not an absolute indication for caesarean delivery. The decision on the mode of delivery is often made based on maternal and fetal stability, gestational age, cervical status and fetal position. The decision and plan for delivery should be made soon after the mother's airway and seizure activity have been stabilised and every attempt to control blood pressure has been made. This is a decision that involves a multidisciplinary team, including neonatologist, as the risk of ongoing morbidity from the seizure and pre-eclampsia can only be mitigated by delivery.

Hypertensive emergencies in pre-eclampsia

Hypertensive emergency in pre-eclampsia is defined by persistent (more than 15 minutes) of SBP >160mmHg, DBP >100mmHg or both. This can occur in the antenatal, intrapartum or postpartum period. The severity of hypertension is known to correlate with the incidence of cerebrovascular event and, therefore, prompt assessment and management of hypertension is essential. The key factors in management of hypertensive emergencies in pre-eclampsia are:

1. Prevention of secondary complications
2. Prevention of eclampsia (as detailed in the section 'Can we predict eclampsia?')

Prevention of secondary complications

The known complications of hypertensive emergencies in pre-eclampsia are cerebrovascular events (for example, intracerebral haemorrhage or acute pulmonary oedema), placental abruption and maternal arterial dissection. While prompt management of hypertension is required, rapid and marked reduction in SBP can lead to a reduction in uteroplacental blood flow with non-reassuring cardiotocograph tracing, or a maternal hypo-perfusion (for example, cerebral, renal or spinal). Therefore, a target SBP of <160/100mmHg is recommended. Rapid-acting oral and intravenous antihypertensive agents are often used for this purpose (Table 2).

- Intravenous labetalol is a rapid acting betablocker with an onset of action from 5–15 minutes. Labetalol should be avoided in patients with bradycardia, asthma and congestive cardiac failure.
- Intravenous hydralazine is a direct peripheral arteriolar vasodilator with an onset of action from 15–20 minutes. Women who are clinically hypovolemic should receive an intravenous fluid preload of 250–500ml of either sodium chloride 0.9 per cent or Hartmann's solution to prevent rapid hypotension.
- Intravenous diazoxide is a rapid-acting potent peripheral arteriolar vasodilator with an onset of action from 2–5 minutes. It has been shown to be more effective than intravenous hydralazine in managing resistant hypertension, though its use is often limited by availability and clinician's familiarity.
- Oral nifedipine (conventional release) is a calcium channel blocker that has been shown to have comparable efficacy as a fast-acting hypertensive agent when compared with intravenous labetalol. However, the use of oral agents should be avoided in patients with altered Glasgow coma score due to the risk of aspiration pneumonia.

Decision on timing of delivery should involve a multidisciplinary team, including obstetricians, physicians and neonatologists. The decision should also take into account the gestational age and maternal and fetal stability.

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Maternal sepsis

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'Hectic fever, at its inception, is difficult to recognise but easy to treat; left unattended it becomes easy to recognise and difficult to treat.'
Niccolo Machiavelli – historian, philosopher, humanist and Renaissance author (1469–1527)

Despite the many advances in medicine, maternal sepsis remains a leading cause of mortality. Prof Michael Humphrey quotes a six-fold reduction in maternal deaths from 1964–66 to 2008–12.[1] In line with the Statement of Health by WHO,[2] sepsis was identified as the third most frequent direct cause of maternal mortality in the world. In developed countries the incidence of maternal mortality from sepsis is far lower as it is largely preventable and more easily treated. This article aims to interpret and apply the new definition of sepsis and surviving sepsis guidelines to improve management of maternal sepsis in practice.

There have been numerous attempts at refining the definition of sepsis. The American College of Chest Physicians and the Society of Critical Care Medicine first developed a consensus definition of sepsis in 1991,[3] which was further modified in 2001.[4] Recognising the advances in the last decade, a taskforce consisting of experts from related specialities was convened to generate the Sepsis-3 definitions. The 2016 Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)[5] have replaced the earlier definitions. To reach a greater global consensus, WHO developed and proposed a new definition of maternal sepsis underpinning the medical concepts in Sepsis-3 definitions.[2]

Sepsis (as per Sepsis-3 definitions) is now defined as life-threatening organ dysfunction caused by a deregulated host response to infection. Organ dysfunction can be identified as an acute change in the total sepsis-related organ failure assessment score (SOFA) by 2 or more (Table 1). SOFA is a poor bedside tool as it requires laboratory investigations and may delay recognition of organ dysfunction. A new score called the qSOFA (quick SOFA) was introduced along with the new definition of sepsis that included altered mentation, systolic blood pressure of 100mmHg or less and respiratory rate of 22 or more. This provides a bedside tool to identify patients with infection who are likely to have a poor outcome. In addition, non-specific systemic inflammatory response syndrome (SIRS) criteria, such as pyrexia and leucocytosis, still aid in the diagnosis of infection.

Sepsis-3 defines septic shock as a subset of sepsis in which underlying circulatory and cellular abnormalities are profound enough to substantially increase mortality.[5] Septic shock can be recognised with clinical construct of sepsis with persistent hypotension requiring vasopressors to maintain a mean arterial pressure (MAP) greater than 65mmHg and a serum lactate level of 2mmol or more per litre, despite adequate volume resuscitation.

Table 1. SOFA Score.

SOFA score	1	2	3	4
Respiration Pao2 / Fio2 mmHg	<400	<300	<200	<100
Coagulation platelet X $10^3/mm^3$	<150	<100	<50	<20
Liver bilirubin (µmol/L)	20–32	33–101	102–204	>204
Cardiovascular MAP (mmHg)	<70	Dopamine ≤5 or dobutamine (any dose)	Dopamine >5 or Adrenaline ≤0.1 Noradrenaline ≤0.1	Dopamine >10 or adrenaline >0.1 or Noradrenaline >0.1
Central nervous system GCS	13–14	10–12	6–9	<6
Renal creatinine (µmol/L) urine output	110–170	171–299	300–440 or <500ml/day	>440 or <200ml/day

Table 2. Physiological factors in pregnancy affecting SOFA score.

System	Effect of pregnancy	Effect on recognition of sepsis
Respiratory Pao2/Fio2	Increase in Pao2 during pregnancy	Normal ratio may be falsely reassuring Once deterioration starts, it may be rapid due to decrease in FRC in pregnancy
Coagulation platelet count	Decrease in circulating platelets due to platelet aggregation and decrease in platelet life span	Can raise a false alarm
Liver S.Bilirubin	Decreased – both conjugated and unconjugated Transaminases are more indicative of liver dysfunction	Normal bilirubin value may indicate mild liver dysfunction
GCS	No change	Good indicator
Renal creatinine	Decreased in pregnancy	Normal creatinine value indicates mild renal dysfunction

Based on Sepsis-3, WHO's definition of maternal sepsis states that it 'is a life-threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion or postpartum period'.[2] This new definition shifts the focus from inflammatory response to life-threatening organ dysfunction. Early recognition and treatment of infection can prevent organ failures. Healthcare professionals caring for pregnant women require a high degree of vigilance and skill to recognise early signs of sepsis.

Onset of sepsis in pregnancy can be insidious and patients may appear deceptively normal before the development of organ dysfunction. Physiological changes in pregnancy can impact on both the SOFA and qSOFA scores, with diagnosis of sepsis often fraught with difficulties. A high index of suspicion has to be maintained, especially in the high-risk group. As per the Green-top Guideline 2012,[6] the risk factors identified (by Confidential Enquiries into Maternal Deaths) are obesity, diabetes, anaemia, invasive procedures such as amniocentesis, cervical cerclage, prolonged spontaneous rupture of membranes, history of pelvic infections or group A streptococcus infection. Any patient who is lethargic, unwell looking with fever, tachypnoea, tachycardia, hypotension or drowsiness in pregnancy or postpartum should prompt the physician to initiate treatment urgently. The outcome of sepsis is improved by early detection, prompt recognition of source and targeted therapy.

Sepsis-3 recommends that once a patient with suspected infection meets two or more qSOFA criteria (bearing in mind the variations in pregnancy), the SOFA score should be calculated to diagnose sepsis. In practical terms, if more than two criteria of qSOFA are present, one should take cultures and consider antibiotics while assessing for organ dysfunction. With respect to calculating SOFA score, the physiological changes in pregnancy should be kept in mind (Table 2).

Aetiology of sepsis during pregnancy and postpartum can be obstetric or non-obstetric. The non-obstetric causes are similar to the general population and range from pyelonephritis and pneumonia to intraperitoneal pathologies. Obstetric-related causes include chorioamnionitis, endomyometritis, pelvic abscess, septic abortion and necrotising fasciitis from wounds, to name a few. Specific symptoms act as a guide in selecting the sites for microbiological sampling.

Management of sepsis and septic shock

Initial resuscitation

Sepsis and septic shock are medical emergencies and resuscitation should commence immediately. There is no evidence for early goal-directed therapy in sepsis (ARISE[7], ProCESS[8] AND ProMISe[9]). The Surviving Sepsis Campaign recommends using initial fluid resuscitation of 30ml per kilo of crystalloid within the first three hours while more specific information is obtained and hemodynamic assessment is made.[10] An initial target is to attain a MAP of greater than 65mmHg and normalise serum lactate as it is a marker of tissue perfusion. Vasopressor therapy (noradrenaline as the first choice) should be considered if unable to achieve a MAP of greater than 65mmHg with fluid resuscitation.

Antimicrobial therapy

Blood and microbiological cultures from potential sources must be obtained prior to initiating antimicrobials. The antimicrobials should be administrated within the first hour of suspecting sepsis.[11] There should be no more than a 45-minute delay in obtaining cultures to facilitate early antimicrobial therapy.[5] Broad-spectrum empiric intravenous antimicrobials should be chosen in accordance with local antimicrobial guidelines. Antibiotic therapy should be de-escalated once the pathogen is identified and sensitivities established.

Indications to move to high dependency unit

Persistent shock despite fluid therapy, respiratory failure, acute renal failure, altered consciousness, multi-organ dysfunction and metabolic derangements are indications to transfer patient to a high dependency unit environment.[6] Central lines and arterial line should be placed for all patients requiring vasopressors as soon as practical.

Source control

Appropriate intervention to control the source of sepsis should be implemented as soon as medically and logistically practical. Removal of retained products of conception, debridement of wound infections and drainage of abscesses should be done without delay. Early general surgical help should be sought for any other suspected non-obstetric surgical complications.

Fetal monitoring

In critically ill pregnant women with sepsis, stabilising the mother is priority. Once in an ICU environment the obstetric team should liaise with the ICU team to plan fetal monitoring and delivery time. Continuous CTG monitoring is recommended. Attempting delivery in the setting of maternal instability increases both maternal and fetal mortality.[6]

Supportive care for patients in ICU

Venous thromboembolism prophylaxis with low-molecular-weight heparin, stress ulcer prophylaxis, adequate nutrition, correction of electrolytes, prevention of pressure sores and family counselling should be embedded in the care of a critically ill obstetric woman.

Adjuvant therapies for sepsis and septic shock

If adequate resuscitation and vasopressor therapy fails to restore haemodynamic stability, the Surviving Sepsis Campaign Guidelines suggest 200mg of intravenous hydrocortisone per day.[10] Intravenous immunoglobulin (IVIG) is not indicated in septic shock. Use of IVIG in toxic shock due to staphylococcal and streptococcal infection should be discussed with infectious disease specialists. Glycaemic control with a protocol-based approach to maintain a blood glucose level below 10mmol per litre is recommended.

Infection prevention

Poor hand hygiene was a recognised cause of spread of puerperal fever in the early 19th century. In 1847, Semmelweis from Austria asked his students to wash their hands with chlorine before examination, which led to a striking decrease in mortality.[12] Today, multidrug-resistant organisms causing hospital-acquired infections have become a major concern. Hand hygiene is the most important infection-prevention technique. A strict adherence to personal protective equipment guidelines is mandatory. Local hospital guidelines should be followed for isolation and contact precaution.

Healthcare workers exposed to group A streptococcal infection should be referred to infectious disease specialists for consideration of antibiotic prophylaxis and the department of health should be notified. A neonatologist should be consulted regarding prophylaxis for the baby.

Summary

Severe sepsis and septic shock are a life-threatening immune response to infection that causes injury to one's own tissues and organs. Early recognition, multidisciplinary approach and prompt treatment decreases mortality and morbidity. Rigorous adherence to sepsis and infection prevention guidelines will help decrease spread of infections.

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The fetal bradycardia

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By RANZCOG Intrapartum Fetal Surveillance (IFS) Guideline 2014[1] definition, a fetal bradycardia is a fetal heart rate (FHR) below 100 beats per minute (bpm) for more than five minutes. This is a simple definition and one which is reasonably consistent in the literature. In a practical sense, however, a fetal bradycardia may be usefully thought of as being either hypoxic or non-hypoxic in origin.

In the RANZCOG Fetal Surveillance Education Program[2] (FSEP) we refer to the non-hypoxic fetal bradycardia as a baseline bradycardia. In other words, a fetus with a bradycardia not attributable to hypoxia. Given the RANZCOG IFS Guideline defines the normal baseline fetal heart rate at 110–160bpm, this would also include the fetus with a baseline fetal heart rate between 100 and 110bpm.

The more common causes of a (non-hypoxic) fetal baseline bradycardia would include a mature parasympathetic system (Figure 1), maternal medication (high-dose beta blockers), a fetal cardiac conduction defect (heart block), or, occasionally, what turns out to be the accidental monitoring of the maternal heart rate, particularly in active labour. These fetuses, and indeed the mother, will generally display one or more physiologically reassuring features, such as regular movement, normal baseline variability, accelerations or even simple decelerations. While a fetal heart block or the accidental monitoring of the maternal heart rate may ultimately have consequences for fetal wellbeing; they are not the focus of this article.

The antenatal cardiotocography (CTG) in Figure 1 was recorded from a primigravid woman at 41+4 weeks gestation. She was being monitored for post-dates. The AFI was reported at 12cm. With a baseline fetal heart rate of 90–95bpm, normal baseline variability and accelerations, this is a well-oxygenated fetus. However, it is an abnormal CTG by definition. In the absence of maternal medication, the baseline bradycardia is most likely the result of a mature parasympathetic nervous system. The fetus is well.

The hypoxic fetal bradycardia is a time-critical heart rate pattern requiring immediate recognition and appropriate management. Research is clear that the longer the bradycardia, the worse the ourtcomes.[3] If a fetus is truly compromised, it is under perfused with oxygen. First-line management therefore, and to some extent regardless of the cause of the hypoxia, should be:

1. reposition the mother to limit cord compression and improve her blood pressure,
2. correct the maternal blood pressure as required; and
3. eliminate the uterine activity, if present, with 250µg SC terbutaline (or equivalent).

More specific management, including delivery, will largely be determined by the overall clinical picture, an assessment of the physiological basis of the bradycardia and the response to first-line

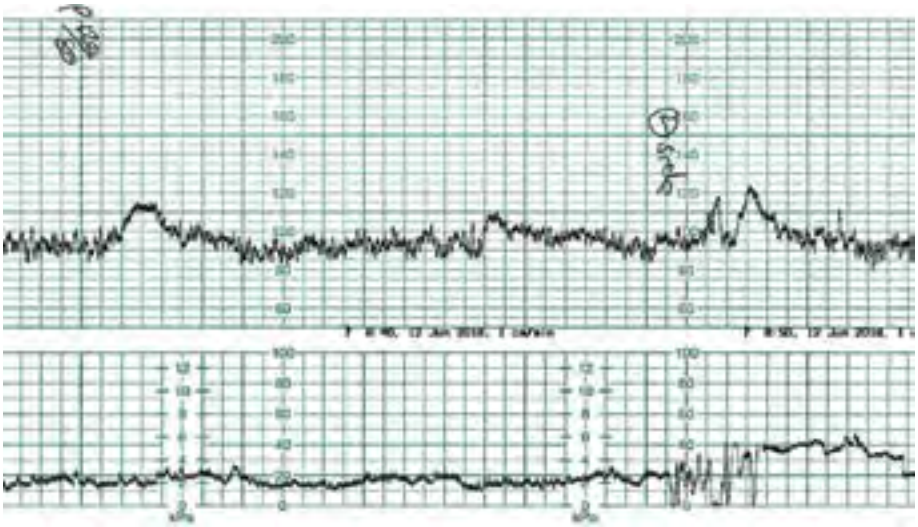

Figure 1. Fetal baseline bradycardia.

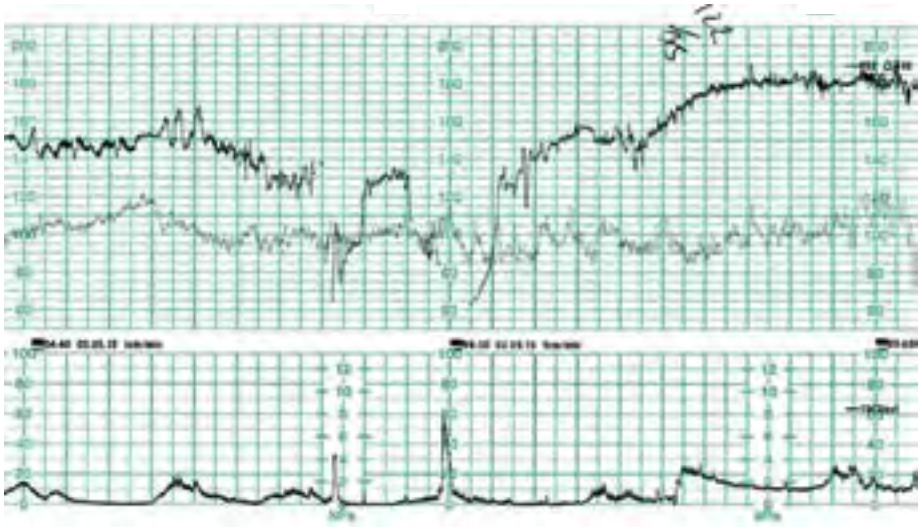

Figure 2. Fetal bradycardia due to (poorly recorded) uterine hyperstimulation.

management. A vaginal examination should be performed to assess progress, exclude a cord prolapse, facilitate the application of a fetal scalp electrode and determine the possible mode of birth. Where the physiological basis of the fetal bradycardia is uncertain, consideration should be given to a sentinel event such as an abruption or uterine rupture.

The more common causes of sustained fetal hypoxia and subsequent bradycardia include uterine hyperstimulation (by tachysystole or hypertonus),[1] maternal hypotension (positional, procedural or anaesthetic),[4] sustained umbilical cord compression, including cord prolapse, or a rapid descent of the fetal head through the pelvis. Less common causes may be placental abruption, placental infarction, uterine rupture or maternal hypoxia.

Fortunately, most fetal bradycardias do have a straightforward cause and are amenable to appropriate management without an emergency caesarean birth. In recognition that some bradycardias are of unknown aetiology, reasonably, preparation for an operative delivery should form part of the overall management strategy in these cases. This is particularly important where there might be a delay in opening an operating theatre, such as in a smaller hospital out-of-hours. Planning ahead is key in these circumstances.

Too often the 'unknown aetiology' of a bradycardia is simply poorly recorded uterine hyperstimulation. Clinicians typically work hard to ensure a high-quality fetal heart rate pattern is well recorded, but this is not always the case with uterine contractions. The maternal habitus can play a part in this and the role of the intrauterine pressure catheter, though effective, is not well defined.

Figure 2 shows such an example, where a primigravid woman at 39+6 weeks gestation was being augmented with Syntocinon for slow progress. There were no other known risk factors. The prior CTG demonstrated a baseline fetal heart rate of 145bpm with normal baseline variability. There were occasional accelerations. There were isolated variable decelerations noted, down 30–60bpm, lasting 45–60 seconds. The uterine activity was recorded at 3–4:10 strong.

Management included maternal repositioning and ceasing the Syntocinon. A vaginal examination at 04:50hrs revealed a thick anterior cervical lip and the fetus in the direct OP position. A post-deceleration overshoot is apparent as the fetus compensates for the period of hypoxia. The woman was transferred to theatre for a caesarean birth and the baby was

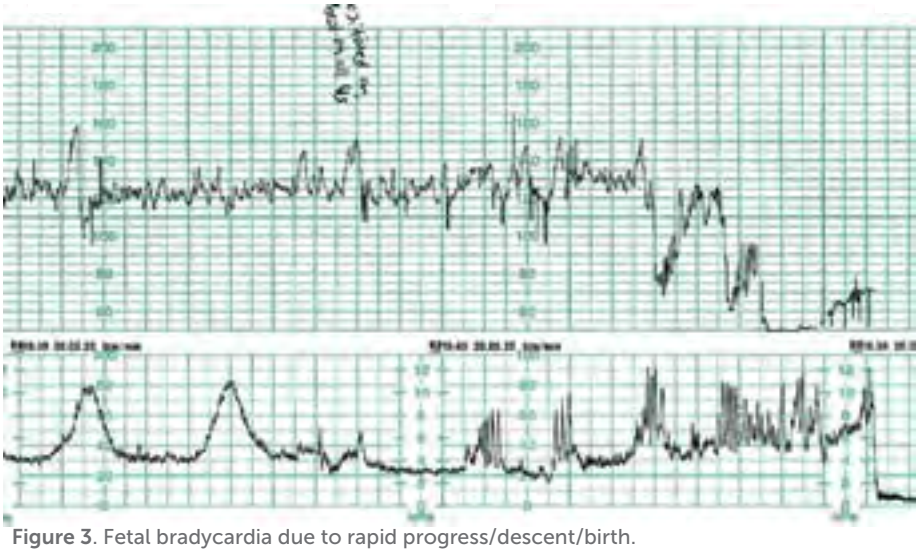

Figure 3. Fetal bradycardia due to rapid progress/descent/birth.

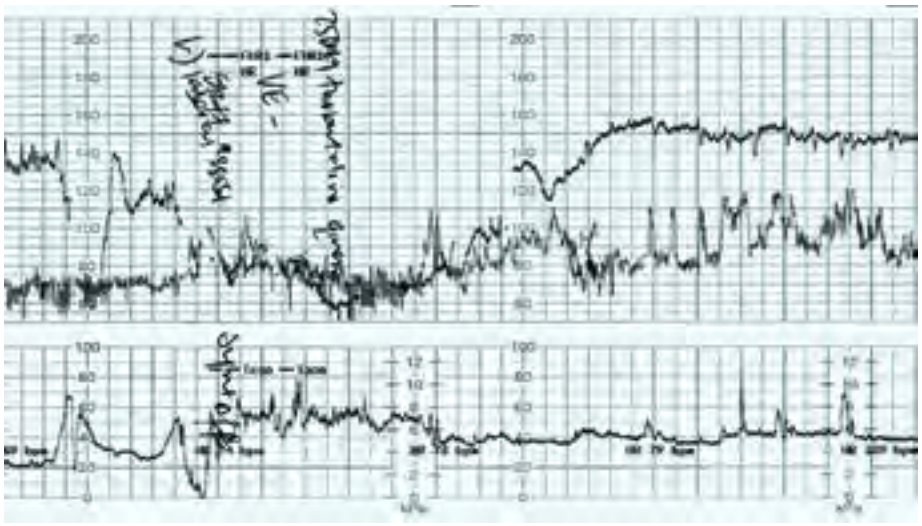

Figure 4. Fetal bradycardia.

born in good condition. Umbilical cord arterial and venous lactates were within the normal range. Later assessment and discussion regarding the CTG centred on the fact that, while the contractions were recorded at 3–4:10 strong and appeared 'modest' on the CTG, most were lasting in excess of two minutes. Tocolysis was not considered at the time and fortunately was not required. This uterine activity should have been described as uterine hyperstimulation (by hypertonus)[1] and conservative management could have been considered earlier.

Figure 3 was recorded from a multigravid woman at 40 weeks gestation. She was being monitored following a deceleration noted on auscultation. The woman repositioned to all fours as a result of increasing bowel pressure. While assistance was called for and preparation was being made to expedite birth, a spontaneous birth resulted. The CTG prior to the bradycardia is highly predictive of a well-oxygenated fetus and the baby would be expected to be in good condition at birth. The baby was born slightly 'stunned' at 10:50hrs with Apgar scores of 7 and 9. No resuscitation was required. Umbilical cord lactates were not performed.

Figure 4 was recorded from a primigravid woman being induced at term for reduced fetal movements. Cervical ripening was undertaken by balloon catheter. The pre- and post-balloon catheter CTGs were normal. An artificial rupture of membranes was performed with clear liquor draining. A Syntocinon infusion had been commenced approximately two hours earlier. The prior CTG demonstrated a baseline fetal heart rate of 130–135bpm with normal baseline variability. There were no accelerations. There were isolated variable decelerations noted, down 30–40bpm lasting 30–45 seconds. Uterine activity was recorded at 3–4:10 strong.

Management in this case was timely and appropriate. The mother was initially repositioned and the Syntocinon infusion ceased. A vaginal examination was performed, revealing a cervical dilatation of 5–6cm and no umbilical cord apparent. Terbutaline 250µg was administered subcutaneously, while preparation for a caesarean birth was underway. A post-deceleration overshoot of the fetal heart rate is again apparent. The fetal response negated the need for an emergency delivery. The Syntocinon was recommenced approximately one hour later, once the baseline fetal heart rate and baseline variability had returned to normal. With most of the uterine contractions lasting 90–120 seconds, a contraction rate of 3:10 was maintained with judicious Syntocinon use. An assisted vaginal delivery approximately six hours later was the final outcome, with the baby born in good condition. Arterial and venous umbilical cord lactates of 6.7 and 4.4mmol/L were recorded, within the normal range for a vaginal delivery.

While there are contraindications to terbutaline/tocolysis use, such as placental abruption or maternal cardiac disease, it is probably an underutilised tool in our management of uterine hyperstimulation. Side effects of a maternal and fetal tachycardia are expected. Concerns regarding uterine atony and excessive bleeding as a result of terbutaline use are not supported in the literature and, with a very short half-life, are unlikely. Importantly, terbutaline does not stop labour, but facilitates intrauterine resuscitation and 'buys' time for management decisions. With a short half-life, most women will recommence contractions within 15 minutes, providing clinicians with a fetal 'stress test' to aid management decisions.

Although some fetal bradycardias are ultimately not amenable to management, those are in the minority. Of those that are amenable to appropriate management, many are the result of uterine hyperstimulation. With most well-grown, term fetuses requiring at least 60–90 seconds of uterine 'rest' between contractions to maintain adequate oxygenation, maternity care providers should be aware of the importance of properly assessing, not just the contractions, but the break between them. It is the break between contractions that counts, not counting the contractions! Clinicians should also be familiar with their protocol for tocolysis, because uterine hyperstimulation will occur.

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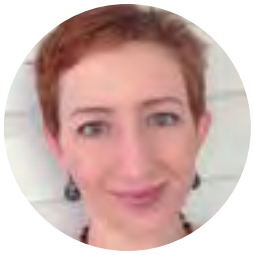
Simulation: applications for emergencies



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From humble beginnings using hessian dolls to practise delivery, simulation is now widely used in obstetrics and gynaecology. The applications of simulation are diverse, and perhaps simulation can be viewed as the Swiss Army knife of an educator's tool kit. It is useful for training in procedural and teamwork skills, testing systems and processes, and enabling cultural change. However, keeping with the analogy, not every task requires a highly engineered and somewhat expensive 12-prong tool, there are potential dangers with misuse, and even the best Swiss Army knife can't clear a forest. This article aims to provide a practical overview of the capabilities and effectiveness of simulation for improving care in obstetric emergencies.

Simulation for training procedural skills

Since Madame Du Coudray travelled the French countryside, obstetric providers have recognised the need for simulation training for obstetric procedures. In this regard, obstetrics (or, more correctly, midwifery) was well ahead of the rest of medicine. More than 200 years later, simulation training in obstetric manoeuvres continues to be of benefit with decreased rates of brachial plexus injury (BPI) in shoulder dystocia[1] and, more recently demonstrated, reduction in severe perineal trauma with forceps births.[2] Other obstetric procedures for less frequently performed manoeuvres, such as complicated vaginal breech, internal podalic version, management of uterine inversion and dis-impaction of fetal head at caesarean, are likely to benefit from simulation training. Improvements in objective patient outcome will prove difficult to demonstrate for these rarer events, but training in

Box 1. Example simulation report form.

Scenario overview:

1. Cord prolapse in antenatal patient on MIPU ward. Urgent transfer to OT for Cat 1 LSCS
2. PPH 30 min post-delivery on birth suite. Resuscitation and condition-specific measures in birth suite. Decision for OT, physical transfer and then safe anaesthesia, ongoing resuscitation and obstetric interventions

Example issues:

MIPU doesn't have an access card for the lift in an emergency – significant delay to OT transfer (and issue in previous RCA) need for key similar to security.

Pre-op checklist not used – discussion re balance between 'standard' safety strategies and need to suspend these in some situations (e.g. similar to red blanket trauma).

Two bleeding patients at once during PPH (sim pt and real one) – safety strategies maintained. No patient details on initial transfusion request form – delay in blood product release. Note that laboratory has 'Medevac' packs – 2x O Negative blood available that can be used during this time.

Failure of Cat 1 LSCS call (simulation issue) in cord prolapse scenario – led to emergency buzzer use (appropriately) in both birth suite and OT.

PPH – Multiple phone calls to blood bank 'sort of' activating MTP/ and subsequent enquiries about whether blood ready, need for single contact point in OT, either anaesthetist or ICU reg.

Waiver of requirement for ethics approval to publish results of this activity were granted by Chair of Gold Coast Hospital and Health Service Human Research Ethics Committee (HREC). Reference: HREC/16/QGC/186

Figure 1. In situ simulation for systems and teams at Gold Coast University Hospital.

these procedures (for which appropriate simulation models are available) should be encouraged.

Obstetric simulators are becoming more technologically advanced, with newer devices incorporating virtual reality (VR) technology to provide objective feedback.[3] Others in development are 'delivering' a total VR experience (for example, www.suzannebakkum.com/birthplay). The marginal benefits in laparoscopic simulation of VR over lower fidelity (and less expensive) simulation would suggest that the role of newer technologies should be delineated further prior to widespread adoption. Whatever the simulator or the task, curricula using simulation training for technical skills should be mindful to avoid simple substitution of 'see one, do one, teach one' to 'sim one, do one, teach one', which may add little to the learner's expertise. Simulation training provides the opportunity for deliberate practice – defining progressive goals specific to the level of skill, immediate and specific feedback, and lots of repetition. When simulation training for procedural skills has been integrated into a Mastery Learning program, both the learning and clinical outcomes are superior to traditional medical training.[4]

Simulation for training teams

Technical skills, whether obtained in a simulation lab or on the job, are just one part of safe outcomes for patients. The recognition that a lack of effective teamwork and communication results in adverse outcomes has led to the introduction of simulation-based teamwork training courses across a variety of clinical environments and specialties.[5] Maternity teams that demonstrate effective leadership, communication (specifically, use of closed-loop communication) and situational awareness perform better clinically than teams who lack these skills.[6] Unlike procedural skills, we understand less about how we learn (and therefore how to teach) leadership and teamwork skills. What exactly ideal maternity teamwork and leadership looks like, and how to teach it most effectively, is an area for ongoing investigation. Despite this lack of understanding, simulation training in teams can improve outcomes in obstetrics. It is how these benefits accrue that is less clear, as there is literature demonstrating minimal impact of simulation training on some behaviours, for example, closed-loop communication.[7] It may be that the clinical benefits seen following multidisciplinary training may not be wholly attributed to gains in technical or teamwork skills of the individuals, but rather the shared training experience.

Simulation for testing systems and processes

Even with highly trained individuals and teams, measurable improvements in clinical outcomes have been challenging to consistently demonstrate following simulation training.[8] Ad hoc teams, unfamiliar equipment and environments, and institutional policies and procedures may be barriers to improving individual, team and system performance. In situ simulation provides a diagnostic modality by which latent threats and other workplace-specific issues/barriers to individual and team performance can be identified, including equipment issues, checklists, communication processes and ergonomics of clinical areas.[5]

Simulation educators can target specific areas for improvement (for example, decision-to-delivery interval, transfusion in postpartum haemorrhage [PPH]) with highly authentic scenarios that require participants to perform in their usual environments. Target outcomes should be informed by institutional quality and safety data and/or clinical audits, and educators are wise to rein in the temptation to only simulate exciting (or even outlandish) scenarios fuelled by their passion for simulation.

Processes for documentation, for example, a 'simulation report form' of the identified (and rectified) latent hazards, should be in place as this information is useful to demonstrate the contribution of simulation to patient safety when clinical outcomes are harder to quantify. Interdepartmental simulations involving midwifery, obstetrics, anaesthesia, OT and blood bank conducted at one institution identified a range of process issues related to communication, notification and departmental interfaces in time-critical emergencies (PPH and cord prolapse) (Figure 1).

Simulation also allows for testing and refining of new equipment, environments, processes and procedures prior to implementation. It is important to ensure involvement from all potential staff (including administrators, lab staff, porters) that may be involved in the final product or process.

Simulation for culture change

Institutional culture and departmental tribalism[9,10] can also be barriers to improving individual, team and system performance in obstetric care. A maternity emergency always involves more than one discipline, each bringing their own perspectives and culture to the scene. While not a panacea for deep-rooted problems of organisational culture, simulation training across departmental interfaces can be a useful strategy for teams to develop a continuity of care perspective and a refocus on the superordinate goal of patient outcomes. Creating, scheduling and running simulations

that engage four or more specialty disciplines at once is a challenge in any unit and support from departmental heads is vital. The rewards from this investment (even when only two or three disciplines train together) can be immense, with many 'light bulb' moments as clinicians gain vital insights into how the others specialties view themselves and others' roles during an unfolding emergency.

Crucial to the success of interdisciplinary simulation is an effective debriefing process involving participants across departmental interfaces. The aim of the debriefing in this instance extends beyond the clinical, team and system lessons learned to providing an opportunity to get to know and understand cross-disciplinary teammates and to learn and rehearse giving and receiving feedback constructively. Exactly how to conduct this debrief and use this shared reflective experience requires further examination.[11]

Summary

Simulation is a multifaceted tool used to improve individual technical skills, teamwork, systems and processes and enhance workplace culture. These improvements combine to create better clinicians, teams and workplaces, positively influencing clinical outcomes for our patients. Expertise and discipline is required to match the simulation training modality appropriately to the desired clinical and organisational goals. A modern 'must have' for all birthing units, this metaphorical Swiss Army knife (consisting of the simulation equipment and appropriate expertise) will continue to expand in scope and effectiveness into the future.

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The aggressive partner

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A young primigravid woman presents at 38 weeks gestation with severe abdominal pain and vaginal bleeding. Her antenatal course has been unremarkable and her partner shows you an extensive birth plan requesting minimal intervention. A CTG is placed urgently and reveals a baseline tachycardia of 180bpm, absent variability, followed by a bradycardia of 70bpm. You suspect a placental abruption and a category 1 caesarean section is arranged and promptly performed under a general anaesthetic, with delivery of a floppy male infant who is transferred to the NICU. You are caught up with several other emergencies, and at the end of your shift you are confronted by the partner who is visibly agitated and angry. He yells at you in the corridor accusing you of trying to 'kill my wife and son'.

Conflict and aggression in the health arena are a growing concern for health professionals. Maternity wards have been identified as a high-risk setting for occupational violence that is defined as 'any incident where an employee is abused, threatened or assaulted in circumstances arising out of, or in the course of their employment.'[1] The field of obstetrics presents unique predicaments for healthcare providers. Childbirth is an emotionally charged milestone event that is not often regarded as a medical episode. It is filled with high expectations and, often, pre-conceived ideas that are inevitably challenged by the unpredictability of pregnancy and labour.

Is it really a problem?

A survey of obstetricians and gynaecologists in the UK revealed that 50 per cent had experienced violence at work in the past year.[2] Similarly, 86 per cent of maternity nurses had been exposed to workplace violence, with patients' relatives (38 per cent) the predominant source.[3] There is increasing evidence that workplace violence contributes to stress and burnout in doctors. In a study of more than 1000 obstetricians, 61 per cent admitted to conflict with patients, and those reporting conflict were significantly more likely to display features consistent with emotional exhaustion (OR 2.8, 95% CI 1.6–4.8).[4]

Causes of conflict

Conflicts may evolve from a number of situations, such as unmet expectations, poor outcomes, discordant goals, inadequate communication, substance abuse and extended wait times. Obstetrics, contrasted with other areas of medicine, often involves detailed assumptions from patients and their families as to the course of their pregnancy and desired outcomes. This may be driven by media, cultural beliefs or the experiences of those close to them. Unexpected situations may arise, such as structural or chromosomal anomalies, miscarriage and other antenatal complications, including preterm birth and fetal demise. The intrapartum period is even more unpredictable. Particularly problematic are obstetric emergencies, where decisions about management are often made and executed swiftly, which may compromise effective communication at the time.

Prevention

Partner inclusion and support

Partners are often neglected during the pregnancy, despite often being the main source of support and counsel for the patient. A longitudinal study of men's experiences of pregnancy showed that overall levels of stress were elevated during pregnancy, at birth and postpartum. Higher levels were seen intrapartum, and especially high if men felt they were unable to fulfil their expected roles.[5] Partners must be supported and prepared for risk and uncertainty in pregnancy to effectively support the patient in achieving a successful parenthood experience.[6] Facilitating partner engagement includes encouraging involvement in antenatal classes and support from clinicians during labour. Barriers to partner involvement have been reported as poor information and lack of support during birth.[7] Withholding information from partners has been associated with increased rates of anger and frustration.[8] Other studies have confirmed that partners often feel excluded in labour, with little control over the situation, and that their lack of knowledge may have prevented them from adopting a more active role.[7]

Early identification of issues

Modern medicine has shifted from the paternalistic model of care and women and their partners are usually hungry for information. As clinicians we should be providing our patients the tools to empower them to make informed decisions regarding their care. The American College of Obstetricians and Gynecologists proposes shared decision-making, which is a 'process where both patients and physicians share information, express treatment preferences and agree on a treatment plan'.[9,10] Antenatal consultations should be used to discuss potential problems that may arise in the pregnancy or in labour. Women should be encouraged to involve their partners in these discussions. Such issues may include refusal of blood products, needle phobias and

high-risk pregnancies. Clear documentation and consideration of referral to other clinicians must not be overlooked. Patients with high-risk pregnancies should be informed of potential complications and recommended interventions. For example, a trial of labour after caesarean section warrants a conversation discussing risks and benefits, as well as the requirement for additional monitoring and intravenous access intrapartum.

Birth plans

Birth plans can be a helpful resource to guide staff as to the woman's preferences and aid in respecting her wishes. Women usually rely on their birth partners to advocate for their plans during labour. Occasionally, clinicians may encounter a rigid or impractical plan. Antenatal detection of such plans is important and a thorough discussion should take place between the couple, taking into account their personal values and beliefs. Preparation and education for parents is crucial as many will often anticipate that labour will proceed exactly according to their plan.[11]

Cultural and language barriers

Language barriers often lead to misunderstandings or incorrect information between healthcare professionals and patients and their families. Feelings of helplessness or frustration may be evoked and successful communication compromised. RANZCOG advises that interpreting services should be provided if required and that relatives should not act as interpreters.[12]

Cultural issues around intimate examinations may arise, including refusal of male clinicians. Occasionally, in an emergency situation, an appropriately trained female staff member may not be available. Patients and their partners should be made aware of this limitation in the antenatal period. Every effort should be made to source a female staff member, and if this is not possible a chaperone should be present if the situation occurs.[13] Staff should be trained in cultural competency and health services should be flexible and promote the use of appropriate culture-specific services, such as Aboriginal liaison officers.[12]

Disclosure and debriefing

Emergency situations are a reality of obstetrics and unforeseen complications are an unavoidable aspect of medicine. When unexpected events occur, an open and transparent approach is required to facilitate a couples' acceptance of the loss of their desired outcome. Disclosure of adverse events leads to higher ratings of quality by patients and a reduction in malpractice suits.[14] It is important that, where possible, this is carried out in a timely manner.

Dealing with conflict

Safety is the utmost priority if confronted by an aggressive partner. This includes for yourself, other staff and the patient. If placed in a potentially violent situation, staff should feel comfortable to call for an emergency code (most commonly, a 'code grey') to summon extra support and assistance. Recognition of warning signs of a potentially violent situation may allow early action and prevention. These include, raised volume or pace of speech, violent gestures, restlessness or refusal to engage. Non-verbal and verbal communication skills should be employed. Non-verbal skills include an open posture, eye contact and active listening such as nodding. Verbal cues may include open-ended questions and empathy with acknowledgement of the person's concerns.[15] It is prudent to consider involvement of senior staff and patient advocates, such as patient liaison officers, to aid in resolution. Careful documentation is essential and follow-up reviews should always be offered.

Conclusion

Violence and aggression are not often encountered in day-to-day practice, but the experience can be distressing for staff, with possible long-term detrimental effects. Dealing with an aggressive partner should focus primarily on prevention and engagement in the antenatal period. Healthcare workers need to be equipped with adequate communication skills and support to identify and manage workplace aggression.

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Notice of Deceased Fellows

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

Dr Boon Ghee Chua, Vic, 5 October 2016
Dr Ma Hung Yu, UK, 8 January 2017
Prof John Victor Malcom Coppleson, NSW, 10 April 2017

Hands off the breech

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Following publication of the Term Breech Trial in 2000[2] there has been a massive reduction in the incidence of vaginal breech birth. This has dramatically reduced staff exposure and familiarity with delivery techniques.

Vaginal breech births will inevitably continue; however, some will be carefully planned for, with maternal choice and informed consent, while others will still be unexpected. This will be due to precipitate delivery, failure of detection in the antenatal period, limited success rates with external cephalic version, intrauterine fetal death and patients with poor attendance or compliance with care. It is therefore vital that despite lack of experience, clinician skills continue to be maintained.

This article will deal with management of the unexpected singleton breech delivery.

When a woman presents with an unexpected vaginal breech, management depends on the stage of labour, any factors associated with increased complications (Table 1), availability of clinical expertise and informed consent.[4]

An unexpected breech may present in labour or may be detected during a routine vaginal examination during labour or induction. At whatever point it is realised, a vaginal examination should be done to exclude cord presentation or prolapse, and ultrasound to estimate the position of the neck and legs.[1]

In a term pregnancy in early labour with no contraindications to vaginal delivery, the patient can be fully counselled toward maternal choice of trial of labour or caesarean section. There is a wide range of information available regarding how best to approach this.[5] If there are contraindications, caesarean section should be encouraged.

Do not offer immediate caesarean section routinely if the patient presents in the second stage or in spontaneous premature labour up to 25+6 weeks gestation.[4,5] A woman presenting in advanced labour and progressing well is likely to have an uncomplicated vaginal breech delivery.

If vaginal breech delivery is to go ahead, neonatal resuscitation equipment should be available. If diagnosed at home, an ambulance should be called for transfer to hospital.[1]

Delivery need not take place in an operating theatre, but ideally there should be recourse to a theatre and personnel, if needed. Emergency caesarean section may be required in 40 per cent of cases. Continuous electronic fetal monitoring (EFM) may lead to improved outcomes. A fetal scalp electrode can be attached to the buttocks if abdominal monitoring is difficult.[5]

There should be a low threshold for caesarean section with a breech in labour. Lack of progress in any stage or EFM signs of suspected fetal distress are good indications. Meconium liquor is not considered a sign of distress in a breech. Fetal blood sampling can be done from the buttocks. Membranes should be left intact, if possible, to reduce the risk of cord prolapse.

An epidural can be offered in view of the increased chance of intervention at delivery and to prevent involuntary pushing.[1] Syntocinon is appropriate to promote passive descent for up to 90 minutes in the second stage and effective pushing.[3] If delivery is not imminent after one hour of pushing, caesarean

Table 1

Factors associated with increased complications for vaginal breech delivery – relative contraindications
Cord presentation
Macrosomia
Footling presentation (presenting part is small and can pass through incompletely dilated cervix or small pelvis)
Intrauterine growth restriction (disproportionally large head)
Fetal anomaly

section should be performed. Total breech extraction is inappropriate for a term breech singleton.[4,6] Delivery can occur on all fours, standing or semi-recumbent. Episiotomy can be done if needed, but not routinely. It should only be done once the fetal anus is visible on the perineum.[4]

If the woman has a strong urge to push, vaginal examination should be done to confirm full dilatation. Rectal dilatation may be noted as the fetal buttocks reach the ischial spines and perineal bulging below that. The fetus should not be touched until spontaneously delivered to the umbilicus, with shoulder blades visible. Complete delivery may then follow without any handling of the baby, save catching it! [5]

Risks at this point otherwise include nuchal arms and a trapped aftercoming head. Avoiding manipulation of the fetus as long as possible is thought to reduce both of these risks.

If spontaneous delivery does not progress, a towel can be wrapped around the fetal hips. Extended legs can be flexed by pressing behind the knees. This is the Pinard manoeuvre.[6] If the fetus is sacroposterior at this point it should be rotated to sacroanterior, and posterior rotation then prevented. Never hold the baby by the abdomen as this can easily rupture the fetal organs. Handling of the cord should be avoided. This causes vasospasm and reduction in flow.[4]

Lovsett's manoeuvre can be used if the arms do not deliver spontaneously.[4] The baby is held sacroanteriorly by its hips with thumbs on the sacrum. Lift and rotate 90 degrees to allow the posterior shoulder under the pelvic brim. Turn 180 degrees keeping the back anterior then dip downward and up for the anterior shoulder. If this fails to deliver the arms, pressure can be applied to the antecubital fossa until the wrist is accessible, then swept down. If this too fails, rotate the baby to sacroposterior facing upwards, which allows easier reaching of the antecubital fossae.

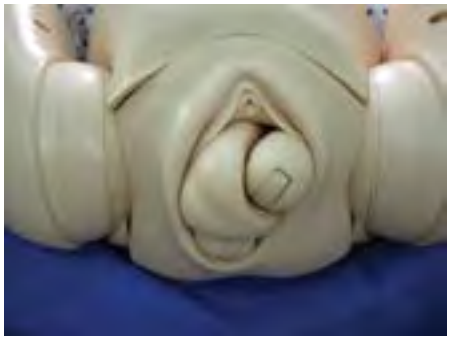


Figure 1. Delivery of fetal legs, step 1.

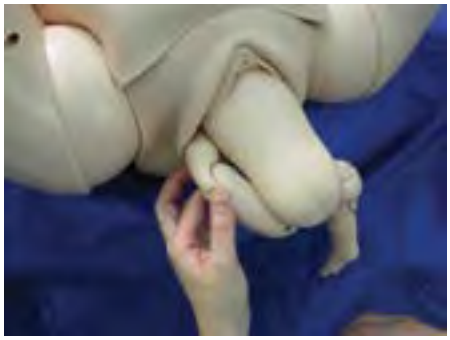


Figure 2. Delivery of fetal legs, step 2.

Once the arms are delivered, allow the baby to 'hang' at the perineum until the nape of the neck is visible. The head may spontaneously deliver with the next maternal effort.[4,5] If the head does not deliver easily and the fetus is premature, the cervix should be checked for full dilatation. If the cervix is felt trapping the head, it can be widened digitally, or Duhrssen incisions made – using scissors to cut the cervix at 2, 10 and 6 o'clock after administering tocolysis (usually terbutaline 0.25mg subcutaneously).[5]

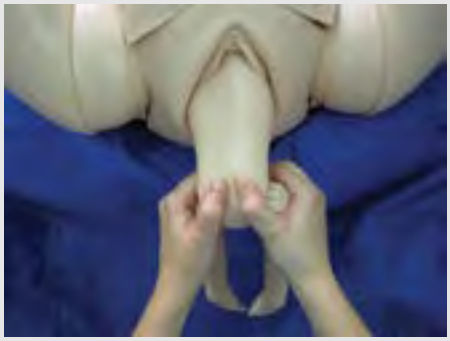
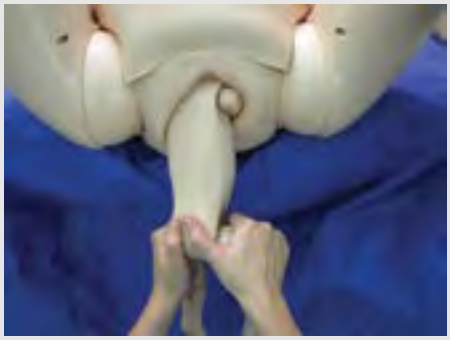
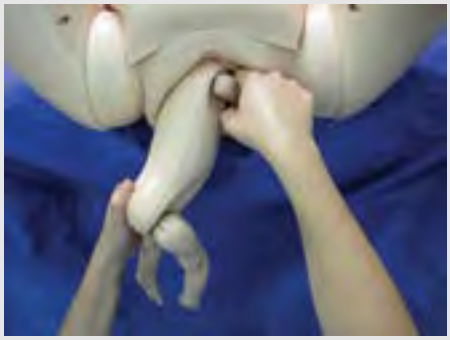


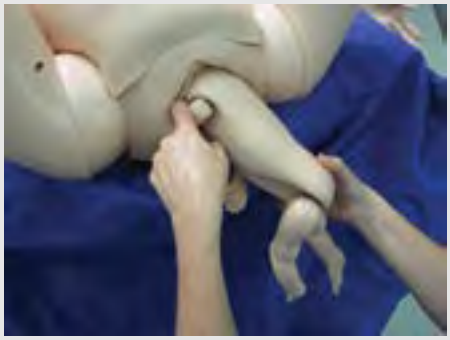
Figure 3a. Lovsetts - Bony prominences.



3b. Lovsetts - First arm under pubic arch.



3c. Lovsetts - Fingers on upper arm.



3d. Lovsetts - Second arm.

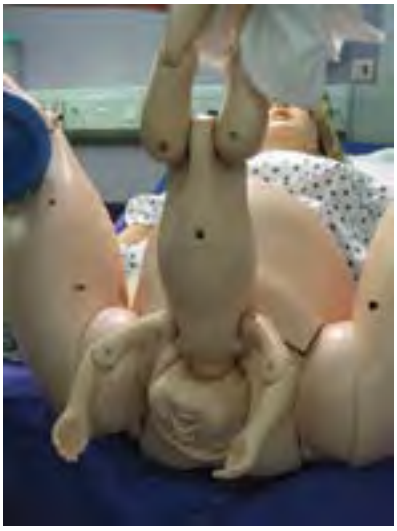
If the head does not deliver easily, there are three options to encourage flexion:

1. Burns-Marshall. The baby is held by the ankles and with ongoing maternal effort the trunk is directed in a wide arc from 'hanging down' to vertically upwards.[1]
2. Suprapubic pressure can be used. This is the Bracht manoeuvre.[6]
3. Mauriceau-Smellie-Veit manoeuvre. Support the baby on the one hand with legs over the arm. Put the other hand into the vagina, one finger on each of the fetal cheekbones and chin. Avoid traction on the jaw. Put the middle finger of the upper hand on the occiput to flex it, others either side on the shoulders.[1]

If repeated attempts of these manoeuvres do not deliver the head, Piper forceps can be used while an assistant holds the baby's trunk and legs to 45 degrees above the horizontal.[4] Insertion of blades can be very difficult and tocolysis may be needed. Blades should be brought together to sit below the fetal body. Literature reports suggest insertion of a Sims speculum to the posterior vaginal wall 'to allow the baby a few breaths', although if the head were low enough for this to actually occur it would likely be deliverable.[6]

Symphysiotomy is an uncommon manoeuvre that can be used at this point. Local anaesthetic should be infiltrated to the skin and down to the pubic symphysis. A rigid catheter should be inserted and

Figure 4a. Burns-Marshall, step 1.



4b. Burns-Marshall, step 2.

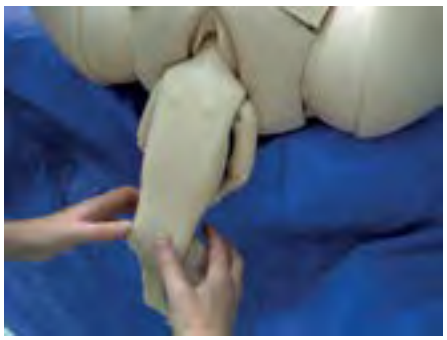


Figure 6. Allowing flexion of head.

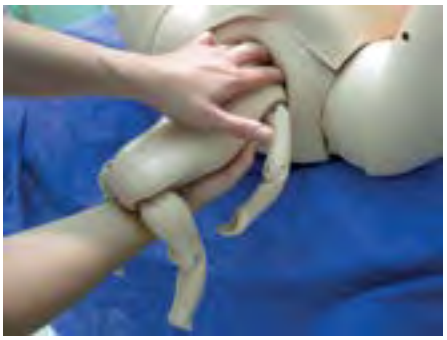


Figure 7. Mauriceau-Smellie-Veit manoeuvre.

used to displace the urethra laterally. Maternal legs should be abducted at 90 degrees. A scalpel should be used to cut down until the pubic symphysis separates enough for delivery. The incision can be sutured and the woman given crutches to mobilise after two days of bed rest.[5]

Last resort is the Zavanelli manoeuvre, pushing the fetus back into the maternal abdomen for emergency caesarean section. The majority of reports are related to caesarean section following shoulder dystocia.[1] Morbidity and mortality rates for this procedure are unquantified. Tocolysis with maternal general anaesthesia is necessary for any chance of success.

All units should have a protocol for the arrival of a woman in advanced labour with a breech. As the situation is infrequent, simulation practice is recommended. This can be done by attending PROMPT, ALSO and/or InTime courses. In addition, a free video demonstrating manoeuvres can be found online at the WHO Reproductive Health Library.

For those faced with the situation in a location with no facilities, the main message would be to call for assistance and 'keep your hands off the breech'.[1,3,6]

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Shoulder dystocia

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The phone rings at 2am: Code Pink, the code for urgent delivery, gets me into action. I live two minutes from the hospital without pants on or three minutes with pants on. As I drive in, three minutes later, I'm thinking about the possibilities: fetal distress, antepartum haemorrhage or shoulder dystocia, to mention a few.

I arrive at the unit and am directed to the birth suite where a mother is on the floor with the baby's head out, no progress and a BMI of 45. It has already taken three minutes and will take another minute or so to get her on the bed, so I decide to try to deliver as she is. This means thinking through the various manoeuvres upside down. Though the suprapubic pressure is not on, it is possible to get 'knees to nipples' on all fours. After an episiotomy has been carried out, internal rotation is attempted, but is not successful. Finally, the posterior arm is delivered and all is well.

Shoulder dystocia is an obstetric emergency that can occur out of the blue and all practitioners, medical and midwifery, involved in deliveries should know and be able to carry out the various manoeuvres to assist in the safe delivery of the baby. In rural areas, except where the doctor is doing the delivery, it is a midwife problem until help arrives. For this reason, it is important that regular practice sessions are held, such as those in the PROMPT program.

The problem

Shoulder dystocia involves the trapping of the anterior shoulder behind the pubic symphysis, though rarely it is the posterior shoulder that is trapped by the sacral promontory. The incidence varies from series to series and to some extent depends on how you diagnose it. In two large series, one of 34,800 the other of 267,228 cases, the incidence varied from 0.58 per cent to 0.70 per cent.[1] From my point of view, at least two of the procedures, outlined below, need to be carried out to make the diagnosis, and numbers are usually extracted from hospital databases, where there is a problem in that garbage in leads to garbage out, so figures may not always be accurate.

Apart from the mechanical problems, there are also complications for both mother and baby. For the mother they include postpartum haemorrhage (PPH), perineal trauma (including third- and fourth-degree tears), not to mention the psychological trauma and difficulty with the bonding process. For the baby, the major problems may be death on the perineum (a disaster), hypoxic encephalopathy (there is a drop in pH of 0.04 per minute after delivery of the head), brachial plexus palsy and other birth trauma.

Can it be predicted?

Risk assessment for predicting shoulder dystocia has a low positive predictive value. Risk factors can be divided into a) antepartum and b) intrapartum. The antepartum risk factors include i) previous shoulder dystocia, ii) clinical or ultrasound suspected large baby, iii) diabetes, iv) BMI > 35 and v) induction of labour. The intrapartum include i) prolonged first stage of labour, ii) secondary arrest, iii) prolonged second stage, iv) oxytocin augmentation and v) assisted vaginal delivery. Most cases of shoulder dystocia occur out of the blue with no predictive factors and normal-sized babies.

Management

The diagnosis is made when there is difficulty delivering the shoulders using normal traction to the head, which must be in line with the fetal spine, without any lateral flexion that may predispose to brachial plexus trauma.

With any unexpected obstetric outcome the first thing to do is call for help; there will need to be at least two people to perform McRoberts manoeuvre (this could involve the partner). Inform the woman that there is a problem with the shoulders and that she will need to be appropriately positioned, which means buttocks at the edge of the bed. We have a double bed in one of our units and so it is easier to bring the buttocks to the side of the bed rather than move her to the end.

In rural hospitals, apart from the Code Pink in our case, a Code Blue or MET call should be made, particularly out of hours when the night staffing is reduced, to ensure there are plenty of people available. The baby needs a carer and maybe resuscitation, there needs to be a scribe and people to cope with the possible PPH. If too many people turn up they can always be shooed away.

The important factor is the length of time from the birth of the head until the delivery of the baby to reduce the change in fetal pH. There is also a difference between whether the woman has an epidural in situ or not as the ultimate manipulation, delivering the posterior arm, is extremely painful without an epidural yet may be the first manoeuvre if she has an epidural.

Manoeuvres possible

1. McRoberts manoeuvre: after getting buttocks to the edge of the bed it involves 'knees to nipples', which means flexion and abduction of the hips. This results in flattening of the lumbar lordosis and altering the angle between the sacral promontory and the pubic symphysis. Allow 30 seconds.
2. Suprapubic pressure (steady): It is important to identify which side of the mother the fetal back is located, as that enables you to determine the direction of suprapubic pressure. It is important that the person doing this knows how to do it and may need instruction if they have not done it before. The hands are placed at the posterior aspect of the anterior shoulder, just like in cardiac massage, and steady pressure is applied to try and adduct the shoulder and move it into a diagonal diameter; an attempt to deliver the shoulder is then carried out. Allow 30 seconds.
3. Suprapubic pressure (rocking): the hands are in the same position as in 2, but pressure is applied intermittently with attempts at delivery of the shoulder. Allow 30 seconds.
4. Internal manipulation: for this it may be necessary to cut an episiotomy, even though it may be difficult. The first manoeuvre involves inserting the appropriate hand to apply pressure to the posterior aspect of the anterior shoulder, so if the fetal back is on the mother's left, the right hand is inserted into the vagina from the posterior aspect of the pelvis where there is more room and using the 'Pringle manoeuvre' (used to get the last Pringle out of the tube), which involves all the digits coming together to form a pyramid that can be inserted into the posterior region of the vagina and then expanded so the whole hand then moves to the posterior aspect of the anterior shoulder and applies pressure to move the shoulder into a diagonal diameter. If this doesn't succeed then the other hand can be placed, by the same mechanism, on to the anterior aspect of the posterior shoulder and attempted rotation. Again, allow 30 seconds for these manoeuvres.
5. If the above manoeuvre fails, the hands can be reversed, without taking them out of the vagina, so the movement is carried out in the reverse direction, that is, anterior of the anterior shoulder and post of the posterior shoulder and rotate in the opposite direction and attempts at delivery of the shoulder should be made. Allow 30 seconds.
6. Delivery of the posterior shoulder: this is the final manipulation tried if a woman doesn't have an epidural, but may be performed after the simple procedures if she has an epidural in situ. The appropriate hand is inserted into the vagina, in other words. the right hand if the back is on the right and left hand if the back is on the left. The arm is identified and the hand moves down the arm to try and grasp the hand, which is then pulled over the fetal abdomen and chest then over the face and removed. It may be difficult to find the hand, you can find the elbow and perform a variation of Pajot's manoeuvre, where pressure is applied to the cubital fossa to flex the elbow and bring the hand into range.
7. If these measures do not work, you can turn the woman on all fours and repeat, though at a faster rate.
8. Fracturing the clavicle by pressure on the mid-point of the clavicle will result in collapse of the shoulder and may result in delivery.
9. Zavanelli manoeuvre has been described, pushing the head back into the vagina then carrying out a caesarean section, but I have never performed this manoeuvre. In a rural setting where theatre staff are not on site, there would be a very high risk of adverse outcome because of the delay in the delivery.
10. Cord gasses should be performed after the delivery and results communicated to those looking after the baby.

Post delivery

It is important that the mother and partner are informed about the complication with an explanation of what happened. It is important to speak to the doctor who has looked after the baby and, if necessary, carry out an examination looking for signs of trauma. The baby needs to be under increased observations.

Always be aware of the possibility for a PPH and perineal trauma up to and including fourth-degree tears. Always perform a rectal examination to assess the sphincter integrity and do a vaginal examination after the repair to ensure there are no lost packs.

Documentation

This is very important as, if it wasn't written down, it didn't happen. The PROMPT Manual has a good example of the information that needs to be recorded, so you don't need to re-invent the wheel. Document the time of delivery of the head, the time the diagnosis was made and assistance called for and then the time taken and description of the manoeuvres carried out and finally the time of delivery of the trunk; after this details like Apgar, resus carried out, blood loss and any other trauma that may have happened can be recorded.

I performed a VBAC and did a mid-cavity forceps delivery, for non-reassuring CTG and had trouble with the shoulders, ending with delivery of the posterior arm. The paediatrician stated that there was an Erb's palsy, though not the arm involved, that, over time, needed surgery. I had noted in the operating report that the position of the head was left occiput anterior, and station 1cm below the spines. It wasn't until I got the solicitor's letter that I realised it was the posterior arm involved, which meant it wasn't the delivery that caused the problem. Adequate documentation saved me from a lengthy court case.

Any shoulder dystocia should be included in the perinatal audit that is carried out, to ensure the process was correct. Again, as shoulder dystocia is often unpredictable, it is important that regular drills are carried out. In a rural setting, midwives are often the primary operator until medical help arrives and so it is important that there is collaboration between midwives and doctors.

Conclusion

VMIA (Victorian Managed Insurance Authority), 'sponsors' of PROMPT, statistics have shown a marked decrease in the number of major claims that involve brachial plexus palsy and cerebral palsy since the introduction of PROMPT and FSEP. All maternity hospitals should have regular training sessions to deal with obstetric emergencies so that all staff are adequately trained. This is particularly important in rural and regional hospitals where night-time medical cover may be minimal.

Umbilical cord prolapse

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A 31-year-old gravida 7, para 4 presented at 38+4 weeks gestation in spontaneous labour. The patient had four previous uncomplicated vaginal births. She had a BMI of 18 with no significant medical co-morbidities, but was a current smoker of 10 cigarettes each day. Intrauterine growth restriction was diagnosed in her last pregnancy so serial growth scans were organised in this pregnancy. Antenatal care was provided at the hospital midwifery clinic with an uneventful antenatal course.

The most recent ultrasound prior to this presentation was at 36 weeks, which showed a normally grown baby in breech presentation with one leg extended. The placenta was posterior and clear of the cervical os. Amniotic fluid index was within normal range.

On initial assessment, fundal height was in keeping with dates with the fetus in cephalic presentation and the head was engaged in the pelvis. Regular uterine contractions were palpable, 4:10 that were noted to be moderate in intensity. Vaginal examination was performed that found the cervix to be 5cm dilated, 1cm thick with a station of spines -1. Bedside ultrasound was performed to confirm cephalic presentation. CTG was normal.

The patient continued in established labour and was offered re-assessment four hours later, which she declined. The next examination was six hours from initial assessment; however, the cervix was unchanged. The patient was offered artificial rupture of membranes (AROM), which was performed by the midwife after explanation of the intervention and with her consent. Clear liquor drained then a loop of pulsating cord was palpable posteriorly.

The midwife manually elevated the presenting part and called for help, with a medical officer and two midwives arriving immediately. The mother was put into left lateral position with elevation of the hips. CTG continued; however, the fetal heart was not detected. A further attempt with Doppler was unsuccessful.

A category 1 caesarean section was called, with the theatre team, anaesthetist and paediatrics registrar notified. A live male was delivered as cephalic within 12 minutes with an Apgar score of 9 at one minute and 9 at five minutes. Birth weight was 3120g and cord gases were normal (arterial pH 7.18, BE -5, lactate 3.7; venous pH 7.24, BE-7, lactate 3.0). The baby was admitted to special care nursery with respiratory distress requiring CPAP. This was complicated by small bilateral pneumothoraces and presumed sepsis. The mother was well after delivery and received debriefing with the team involved and support from the perinatal social worker. Both mother and baby were discharged day four postpartum.

Discussion

Umbilical cord prolapse occurs when the umbilical cord has descended past the presenting part following either spontaneous rupture of membranes (SROM) or AROM. A pulsatile cord may be palpable on vaginal examination or cord may even be visible in the vagina. Cord presentation refers to the umbilical cord lying over the presenting part when the membranes are intact.

Overall incidence of umbilical cord prolapse is 0.1–0.6 per cent, with a perinatal mortality rate of 91 per 1000.[1] The combination of cord compression and vasospasm prevents blood flow to the fetus, causing asphyxia or death.[2] Risk factors for umbilical cord prolapse include multiparity, polyhydramnios, unstable lie or breech presentation.[3] Antenatal factors where the presenting part is poorly applied to the cervix increase the likelihood of cord prolapse and must be considered when planning AROM. In this case, the contributing factors are AROM and multiparity; however, unstable lie may be possible, given the finding of breech presentation on ultrasound at 36 weeks. Preterm labour is also a risk factor for cord prolapse and further contributes to the reported morbidity and mortality.

Management

In the presence of an abnormal CTG after rupture of membranes, a vaginal examination should be performed to exclude cord prolapse. In this case, the midwife assessed the application of the head after liquor drained and in doing so detected the pulsating cord from the cervix.

Cord prolapse is an obstetric emergency and delivery must be expedited. Cord prolapse occurring before full dilatation requires emergency caesarean section. An assisted vaginal delivery can be considered if the cervix is fully dilated, depending on factors including parity, station and fetal wellbeing.

Once detected, call for help and manually elevate the presenting part off the cord. When help arrives, a team member should have the role of scribe and note the time. The woman should be moved on to all fours position, with knees to the chest or placed in the left lateral position with the hips elevated. Cord handling should be minimised to prevent cord spasm. There is no evidence to support the use of saline-soaked gauze or manually replacing the cord.[1]

Fetal heart rate should be monitored and urgent transfer to theatre organised, with anaesthetic team present as well as staff trained in neonatal

resuscitation. In the absence of regional anaesthesia, a general anaesthetic should be used to minimise the interval to delivery.

If oxytocinon infusion is in use, it should be stopped immediately. If there is a delay in transfer to theatre, tocolysis can be considered in an effort to reduce compression on the cord; however, this should not delay definitive treatment.[1]

Filling the bladder with 500ml of normal saline has also been described to elevate the presenting part off the cord as well as inhibiting uterine contractions.[4] This can be used if there will be a delay in delivery, such as during transfer to hospital from the community setting. The elevation of the presenting part should continue until the time of delivery. Paired cord gases should be obtained at delivery.

The woman and her support people should have a timely debrief to discuss the events and address any questions or concerns there may be. This is also an opportunity to discuss mode of future deliveries and offer reassurance.

Can cord prolapse be avoided?

Women with unstable or transverse lie can be offered admission from 37 weeks. Those with high risk of cord prolapse should be admitted after rupture of membranes and delivery should be planned. Inpatient management allows for adequate monitoring and minimises delay in diagnosis and interval to delivery. Those with non-vertex presentations with preterm prelabour rupture of membranes are at significantly higher risk of cord prolapse and should be managed in the inpatient setting.[1,5] Those women with known risk factors should be counselled antenatally about cord prolapse and be encouraged to present urgently if contracting or after rupture of membranes.

AROM should be avoided when the presenting part is high. If the head is poorly applied, this should only be performed when necessary and in the presence of senior medical staff and within access to emergency theatre. During vaginal examination, upward pressure on the presenting part should be avoided as this may disengage the head, predisposing to cord prolapse.

AROM must be avoided if there is uncertainty regarding vaginal examination findings. If there is concern regarding the presence of cord with membranes intact, a senior practitioner should review and proceed as appropriate. If a cord presentation is detected in labour, a caesarean section should be performed.[1]

Can cord presentation be detected antenatally?

The use of routine ultrasound to detect cord presentation is not recommended.[1] In a study of 13 cases of cord presentation detected on third trimester ultrasound, seven women were followed up with repeat ultrasound scans. Four patients were found to have resolution of cord presentation and had uncomplicated vaginal births. Out of the remaining three patients, two had elective caesarean sections for persisting cord presentation with one requiring emergency caesarean section for cord prolapse.[6] Cord presentation and cord prolapse are therefore not synonymous; however, the association is higher in non-cephalic presentations.

In a study group of 198 breech presentations after 36 completed weeks gestation, 4 per cent had cord presentation diagnosed on transvaginal ultrasound. These women were counselled and seven opted for elective caesarean section. In six of the seven cases, cord presentation was found at the time of delivery.[7]

In summary, women with multiple risk factors for cord prolapse should receive appropriate antenatal counselling and advised to present early if in labour or if SROM is suspected. Discussion regarding mode of delivery is also relevant in those with non-cephalic presentations or those with the incidental finding of cord presentation on third trimester ultrasound scan. In such cases, follow-up scans may be appropriate depending on gestation. Maternity staff should be trained in management of cord prolapse with regular simulation training and drills.

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Uterine inversion

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Obstetric haemorrhage is still the leading cause of direct maternal deaths in Australia. Of these, uterine inversion is a rare, but critical, subset, with an incidence of one in 1200–8000 and maternal death occurring in 15 per cent of cases.[1-3] It arises when the uterine fundus descends into the endometrial cavity, where the inner walls of the uterus may be exposed through the cervix or vagina. Although 5 per cent of cases occur on a non-obstetric basis, usually due to externalisation of a uterine mass or lesion, in this article we will primarily refer to the obstetric emergency.[4]

Most causes of uterine inversion are commonly associated with uncontrolled cord traction or excessive fundal massage, though there are cases in which no tension was applied to the cord.[4] Additionally, a placenta that has partially detached or invasive placentation may increase the risk of uterine inversion.[5] Fetal macrosomia, primiparity, fundal placentation, uterine lesions or anomalies, short umbilical cord and a rapid delivery have been considered theoretical risks, but these causes are present in fewer than 50 per cent of cases.[4,6-7] Uterine inversion can occur with minimal predisposing risk factors.

Uterine inversion can be classified quite simply by the position of the uterine fundus. A first-degree or incomplete inversion places the fundus inside the endometrial cavity.[8] When the uterine fundus protrudes through the cervical os, it is categorised as a second-degree or complete inversion.[8] Once the uterine fundus projects to or beyond the vaginal introitus, it is considered a third-degree inversion or uterine prolapse.[8] Lastly, inversion of both the uterus and vagina is a fourth-degree or total uterine and vaginal inversion.[8] A review of uterine inversion, which included 358 cases, presented that 90 per cent of cases were complete or prolapsed uterine inversions (second- and third-degree inversions).[9]

Early diagnosis and management is vital and can prevent haemodynamic shock and mortality. Uterine inversion can arise during vaginal birth or caesarean section, with inversion during vaginal delivery being more difficult to diagnose and manage. When uterine inversion is encountered during caesarean section, there is adequate analgesia and tight control of haemodynamic stability. Additionally, inversion is recognised readily and the uterus is replaced easily under direct vision without the formation of a cervical constriction ring. Post vaginal birth, the placenta is commonly still partially attached. This is also associated with a severe postpartum haemorrhage, owing to the stretching of the implantation endometrium (similar to atony), allowing an exacerbation of bleeding.[3] Other clinical features include lower abdominal pain and haemodynamic instability or shock. In some cases, it was noted that the haemodynamic instability was disproportionate to the blood loss. This has been theorised to be related to stretching of pelvic parasympathetic nerves, leading to neurogenic shock.[10] The issue with this theory is that due to emergent nature of these cases, there may be an underestimation of blood loss.[10] Clinical signs, such as loss of a palpable uterine fundus or a vaginal examination that reveals an abnormal soft mass, are also diagnostic, but in most cases (90 per cent) the uterine fundus can be visualised externally.[9] Medical imaging may be used to confirm diagnosis when symptoms are subtler; for instance, in the 10 per cent of cases where an incomplete inversion has occurred. Ultrasound findings described as 'upside-down and inside-out' or 'pseudostripe' have been noted in previous case studies.[5,11]

Figure 1. Johnson's Manoeuvre – manual reduction of uterine inversion.

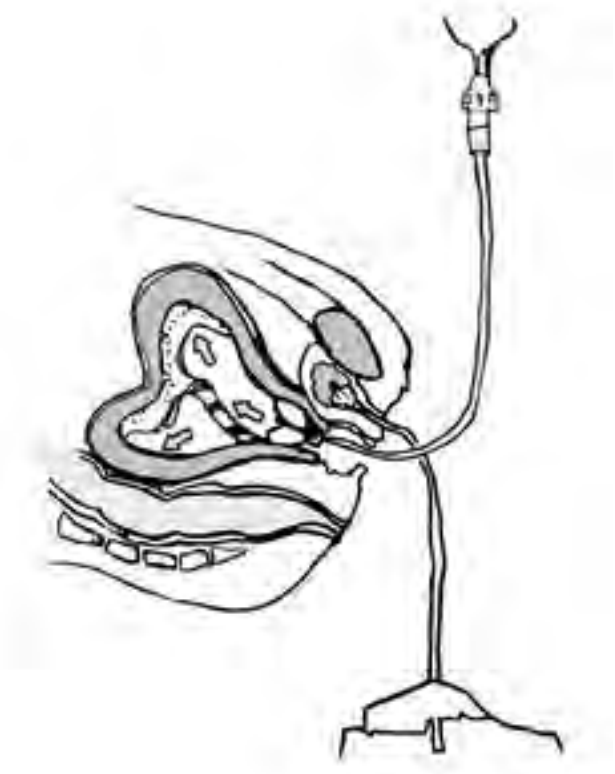

Figure 2. Hydrostatic reduction of uterine inversion.

Uterine inversion requires early diagnosis and rapid management. Management has two key elements. Firstly, return of the uterus to its anatomical position promptly while preventing re-inversion. Secondly, the management of postpartum haemorrhage while counteracting haemodynamic instability. The latter requires adequate intravenous access and aggressive fluid and blood product resuscitation. Uterotonic agents should also be ceased if uterine inversion is diagnosed, until after replacement of the uterus.

The reversal of the uterine inversion can be completed with Johnson's manoeuvre (Figure 1). Prior to detaching the placenta, (removing the placenta prior to replacement increases blood loss) a hand is placed inside the vagina and pressure is applied along the axis of the vagina towards the umbilicus. The earlier this is attempted, the higher the chance of success, while minimising blood loss.[5] A delay leads to an increased failure rate due to the formation of constriction ring as the cervix begins to contract, which minimises space to perform Johnson's manoeuvre.[4] If initial immediate attempts fail (30 per cent of reported cases), the involvement of a multidisciplinary team including anaesthetists, theatre staff and ICU is critical.[9] This manoeuvre may be attempted again under anaesthesia and with the cessation of uterotonic agents administered postpartum and the usage of utero-relaxants. Glyceryl trinitrate (GTN) may be considered first line due to its ability to relax smooth muscle rapidly and short half-life, reducing the risks of worsening any associated bleeding.[12] Other utero-relaxants, such as magnesium sulphate and terbutaline, may be considered.[12]

An alternative method of reversing the uterine inversion without surgical intervention has been documented in multiple case reviews. Hydrostatic reduction (Figure 2) can be accomplished by placing

the patient in a reverse Trendelenburg position with lithotomy, replacing the externalised uterus and contents (partially detached placenta) into the vagina, then placing a suction cap (such as, neonatal ventilation mask, 22/24 Fr indwelling catheter balloon) inside to form a seal with the vaginal walls.[13] A free-flowing, warmed fluid bag is hung at least one metre above the patient and allowed flow into the vagina via the suction cap.[13] The pressure applied intravaginally by the accumulation of fluid may return the inverted uterus to its anatomical position. Recent case reports have stated that if the uterus cannot be replaced manually, hydrostatic reduction should be attempted prior to surgical interventions, depending on haemodynamic stability and blood loss.[13]

If conservative measures have been unsuccessful or the patient is haemodynamically compromised, surgical correction is the next appropriate step (Figure 3). The most common approach involves a laparotomy followed by the Huntington procedure and/or Haultain procedure. On entry into the abdomen, a cup-like structure is usually visualised in place of the uterus with the bilateral round ligaments, fallopian tubes and ovaries being retracted inwards. This is the cervical ring structure.

Huntington's procedure involves a replacement of the uterus by retracting the fundus superiorly with atraumatic instruments (Allis forcep or Babcock clamp) grasping the round ligaments and reapplying medially as more of the round ligament becomes visible. Simultaneously, reduction may also be attempted vaginally to facilitate correction of the uterine inversion. Haultain's procedure involves a sharp dissection of posterior aspect of the uterus. The incision is to release the constriction ring, allowing additional space for manual replacement of the uterus, or Huntington's procedure to be completed. Finally, a repair of the posterior incision concludes this procedure. An anterior incision or Ocejo incision may also be considered, but with some risk of a bladder injury due to distortion of the anatomy immediately postpartum.

There are published case reports of laparoscopic-assisted reduction of uterine inversion and vaginal approaches to dissection of the cervical constriction ring (Spinelli's procedure), but these are performed rarely.[14,15] No cohort studies or trials are available to evaluate success rates or compare surgical interventions for uterine inversion due to the low incidence of failed conservative reduction.

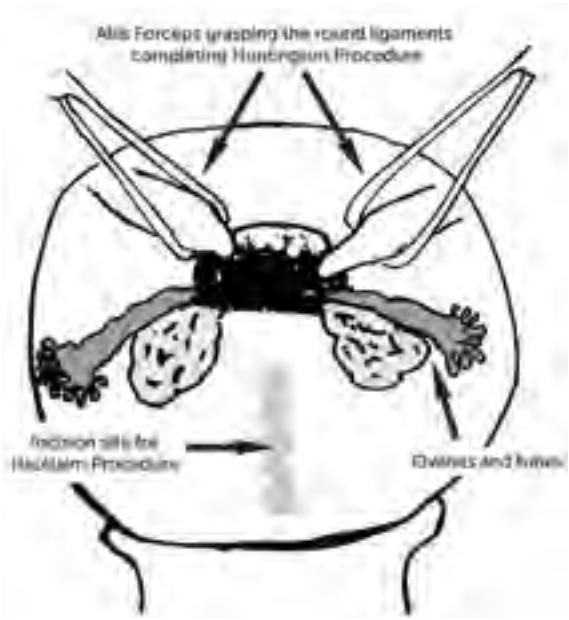

Figure 3. Surgical reduction techniques of uterine inversion.

Delivery of the placenta should only occur after repositioning of the uterus. Manual removal of placenta was completed in most case reports, after uterine replacement, followed by administration of uterotonic agents to minimise blood loss and prevent re-inversion of the uterus.[10] Some case reports have also documented the use of an intrauterine balloon catheter (Bakrii) to again assist with any blood loss and prevent reinversion.[16] Lastly, to prevent postpartum endometritis, broad spectrum antibiotics should be considered.

Uterine inversion is an obstetric emergency that requires prompt diagnosis and management to prevent maternal morbidity and mortality. Due to its scarcity, practitioners will have limited experience, but with early diagnosis and timely management to replace the uterus while preventing haemodynamic compromise, a good outcome can be anticipated. Owing to the lack of predisposing features for uterine inversion, clinicians should be ever vigilant about uterine inversion in situations that involve a postpartum haemorrhage.

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Crash caesarean

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Emergency delivery in the setting of suspected fetal or maternal compromise is a challenge confronting the obstetric unit every day. Currently, the long-established decision-to-delivery interval (DDI) of 30 minutes for the most urgent cases remains the benchmark by which health services are measured. However, it is important to note that the evidence to suggest this improves neonatal outcomes is mixed.[1,2]

Currently, RANZCOG recommends a more nuanced approach to caesarean section (CS) urgency classification based on individual assessment, while recognising the importance of the 30-minute benchmark.[3] These categories are as follows and are essentially similar to other professional organisation recommendations, including the Royal College of Obstetricians and Gynaecologists (RCOG) and the American College of Obstetricians and Gynaecologists (ACOG).[4,5,6]

Category 1: Urgent threat to life or the health of a woman or fetus.
Category 2: Maternal or fetal compromise, but not immediately life threatening.
Category 3: Needing earlier than planned delivery, but without currently evident maternal or fetal compromise.
Category 4: At a time acceptable to both the woman and the caesarean section team, understanding that this can be affected by a number of factors.

RANZCOG recommends no specific time interval attached to each of the categories of urgency, although both RCOG and ACOG use 30 minutes as their benchmark for Category 1.

What is an imminent threat to life?

Before assessing the effectiveness in meeting the DDI, it is important to have a clear classification for what meets the criteria for urgent threat to the life or health of the women or fetus. Clinical features thought to be consistent with Category 1 include placental abruption, cord prolapse, uterine rupture, intrapartum haemorrhage or presumed fetal compromise.[7]

However, this is a heterogeneous group of conditions and there remains a spectrum of clinical urgency that makes it difficult to define each into discrete categories. On retrospective analysis of the last National Sentinel Caesarean Section Audit in the UK, only 51 per cent of Category 1 CS fulfilled the above criteria of imminent threat to life. Most of the remaining Category 1 CS were for suspected fetal compromise, where on retrospective review, the abnormal CTG was judged to not be of significant severity to be an imminent threat to the life of the fetus and should instead have been reclassified as Category 2.[7]

The significant limitation in establishing the urgency of delivery remains the broad spectrum of fetal heart rate abnormalities that would suggest fetal compromise and need for delivery. This highlights the difficulty in ensuring compliance with the suggested DDI times for each category when categorising the urgency in a given situation is so variable. Essentially, this requires individualised assessment of the clinical situation and the urgency associated with it.

Factors that improve DDI

Factors that improve DDI time for Category 1 CS encompass practical aspects, such as dedicated obstetric operating theatres in close proximity to labour ward and 24-hour access to obstetric, anaesthetic and theatre staff. Once a 'crash' CS is called, it requires effective communication and teamwork between the obstetric, midwifery, anaesthetic and theatre staff to prevent unnecessary delay. Simulation training and dedicated protocols for category 1 CS have been shown to improve DDI times.[9] Communication errors between team members, particularly regarding the level of urgency, were major contributors to unnecessary delay.[8] One way to overcome this is to include a dedicated overhead code call such as 'code green' that immediately alerts all staff in the hospital to the urgency of the delivery and allows for increased coordination between the multidisciplinary team.

Table 1. Code grreen audit.

Code green audit	
Reason	Events
Abnormal CTG	6
Bradycardia	8
Cord prolapse	4
Malpresentation	5
APH	1
Failed forceps	1
Other	1

Table 2. Code green audit results.

Code green audit results	
Cord Gas pH	Number of deliveries
>7.2	14
7.0–7.19	4
<7.0	1
NR	7

At the Mercy Hospital for Women, we have a specific 'code green' protocol that involves an overhead announcement simultaneously alerting all parties concerned to the urgency of the delivery. This triggers the opening of a dedicated theatre, which is then set up for immediate delivery. Transport staff are sent to collect the patient, while obstetric and midwifery staff prepare the patient and accompany them to theatre where anaesthetists are waiting for a possible general anaesthetic and a paediatrician is present in case of neonatal resuscitation. Ideally, the DDI time for a 'code green' crash CS is less than 15 minutes, but it requires extensive coordination between staff.

As a large women's metropolitan tertiary centre, we are particularly well resourced to provide this level of care, but these resources are not necessarily available at many centres throughout Australia that often do not have access to 24-hour staffing or have to share operating theatres with other specialities. This resource limitation can provide significant impediments to achieving the desired DDI.

Code green audit

The Mercy Hospital for Women undertakes three-monthly reviews of our 'code green' CS to ensure we are meeting our current recommendations and to identify opportunities for improvement. An audit conducted from January to March 2016 showed 26 'code green' CS out of 1449 total births (1.8 per cent) or 18 per 1000 births.

There was no difference in 'code greens' based on time of the day or the day of the week. The predominant reasons were abnormal CTG or fetal bradycardia, comprising over half the cases.

The average DDI time was 31 minutes, with a wide range of times from seven to 98 minutes. Although this comes close to the 30-minute benchmark, it falls significantly short of our ideal DDI of 15 minutes for a 'code green' CS at our centre. In 16 patients the DDI was less than 30 minutes, with eight being greater than 30 minutes and two not recorded.

Despite some of these prolonged DDI times, the impact on neonatal outcomes remains controversial. There were only five cases with recorded cord gas pH less than 7.2 and only one where the DDI was greater than 30 minutes. That case had a 51-minute DDI time in the setting of fetal bradycardia with an attempted instrumental delivery that failed and progressed to a subsequent CS with a cord gas pH of 7.1. The remaining four cases were in the setting of an abnormal CTG, a fetal bradycardia, a placental abruption and a preterm breech delivery where the DDI was 23, 15, 15 and seven minutes respectively.

The average cord gas pH in those with DDI times greater than 30 minutes was 7.28, despite a number being called for CTG abnormalities including fetal bradycardia. This compares with the average cord gas pH of 7.16 in those that delivered in less than 30 minutes. This suggests that the underlying cause for the 'code green' and the individual patient assessment is a more relevant contributor to poor neonatal outcomes than the DDI itself. Even across similar delivery indications, such as fetal bradycardia, some will have a more reversible cause, such as post-epidural bradycardia or uterine hyperstimulation, which allows for potential intrauterine resuscitation prior to delivery compared with those associated with placental abruption or cord prolapse.

This individual assessment of urgency is particularly relevant given the potential for psychological trauma from the crash CS experience to the patient and her family. Having the flexibility within the code system to stand down or slow down a Category 1 CS if there is evidence the trigger is resolving or less life threatening than initially thought can potentially reduce the trauma associated without significantly impacting on neonatal outcomes. This practice is suggested in the audit as those with longer DDI were more likely to have a spinal rather than a general anaesthetic and normal cord gases, demonstrating that the urgency had likely been clinically downgraded.

Conclusion

The risk of imminent harm in a patient remains an evolving continuum that requires flexibility and individual evaluation when assessing the clinical urgency of delivery. Crash CS, however, remains a vital part of obstetric emergency care and it is important that hospitals have effective systems in place to optimise urgent delivery when it is deemed clinically necessary. Regular audit and review plays an essential part in recognising hospital limitations and areas for potential improvement.

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Postpartum haemorrhage

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Postpartum haemorrhage (PPH) is the leading cause of maternal morbidity and mortality worldwide, with WHO estimating that 25 per cent of direct maternal deaths are attributable to PPH.[1]

Maternal deaths are rare in developed countries such as Australia and New Zealand; however, PPH is not. Estimated to complicate 5–15 per cent of births in Australia,[2] it is imperative that all maternity care providers are proficient in managing PPH. Each centre providing care for pregnant women should have well-established protocols that are routinely rehearsed in a multidisciplinary setting.

PPH may be primary, within 24 hours of childbirth, or secondary, from 24 hours to the completion of the puerperium. Blood loss of more than 500ml constitutes a PPH, and more than 1000ml is considered a major PPH.

The third stage of labour

During a normal third stage the uterus contracts, causing separation and expulsion of the placenta and membranes. This contraction of the myometrium compresses the myometrial vessels that have vascularised the placental bed throughout pregnancy. Local decidual haemostatic factors also contribute to haemostasis. At term, uterine artery blood flow is 500–700ml per minute; hence, disruption in either of these mechanisms may lead to rapid haemorrhage.

Retained tissue inhibits the normal ability for the uterus to contract, causing PPH. If unrecognised, this may also cause endometritis and secondary PPH. Birth canal trauma may cause overt and occult blood loss, and women with a thrombophilia, diagnosed or undiagnosed, are also at higher risk of PPH.

The causes of PPH are often summarised as the four Ts: tone, trauma, tissue and thrombin. An additional T has frequently been added to emphasise the utility of an operating theatre in the management of severe PPH.

Risk factors

There are multiple identified risk factors for PPH (Table 1), but most occur in women without any. Risk factors may be present antenatally or develop intrapartum; hence, care providers must remain alert and alter management plans accordingly.

Recognition

Revealed PPH may be rapid and easily recognised. However, PPH can also occur insidiously, with a slow trickle over many hours, or via occult loss, that is, into a pelvic haematoma, potentially delaying recognition and treatment. This is a particularly dangerous scenario as significant blood loss can lead to coagulopathy and intravascular depletion, making successful resuscitation, once PPH is recognised, all the more difficult.

Due to physiologically expanded circulation, with the healthy parturient carrying a circulating blood volume of approximately 100ml/kg, large volumes of blood may be lost before haemodynamic instability is evident. It is difficult to 'catch up' if early losses are not recognised. It is also widely recognised that visual estimation of blood loss may underestimate; hence, weighing is essential to improve accuracy of estimates and guide resuscitative measures.

Management of PPH

Initial management is two pronged, with simultaneous resuscitation to restore haemodynamic stability and targeted treatment of the underlying cause(s) both paramount to successful outcomes.

Table 1. Risk factors for PPH.

Risk factors for PPH
Previous PPH
Multiple pregnancy or fetal macrosomia
Prolonged or precipitate labour
Induction of labour
Physiological third stage
Assisted vaginal delivery or caesarean section
Morbidly adherent placenta
Hypertensive disorders of pregnancy (PET, HELLP, eclampsia)
Obesity
Grand multiparity
Uterine infection
Fetal death in utero

Table 2. Symptoms related to blood loss with PPH.[3]

Blood loss, % (ml)	Blood pressure	Signs and symptoms
10–15 (500–1000)	Normal	Palpitations, light-headedness, slight increase in HR
15–25 (1000–1500)	Slightly low	Weakness, diaphoresis, tachycardia (100–120bpm)
25–35 (1500–2000)	70–80 systolic	Restlessness, confusion, pallor, oliguria, tachycardia (120–140bpm)
35–45 (2000–3000)	<70 systolic	Lethargy, air hunger, anuria, collapse, tachycardia (>140bpm)

General measures when PPH is recognised, include:

- Summon additional assistance and designate roles as appropriate
- Designate a scribe to contemporaneously document events
- Ensure initial and frequent vital signs measured
- Insert two large-bore (16g) IV cannulas
- Send blood for FBE, group and save, coagulation studies
- Insert indwelling catheter with burette for fluid balance
- Initial volume replacement with warmed isotonic crystalloid, that is, CSL or 0.9% NaCl
- Prevent hypothermia, which may exacerbate acidosis and contribute to coagulopathy

Tone

Uterine atony is thought to cause 75–90 per cent of PPH.[4] In most instances, atony will respond to first-line uterotonics (Syntocinon, Syntometrine), uterine massage and the insertion of an indwelling catheter. Torrential atonic PPH can be stabilised via bimanual uterine or aortocaval compression while resuscitative efforts commence, assistance obtained and transfer to theatre organised.

Management should include stepwise use of available uterotonics, taking into account individual patient contraindications, with early recourse to definitive surgical management in the unstable patient where medical management is proving ineffective. The discontinuation of local production of dinoprost (PGF2α) has led to the alternate use of carboprost (15-methyl- PGF2α). The reconstitution, dosage and administration of these medications differs; thus, it is important for clinicians to be aware of which they have at their facility, and how to use them.

Trauma

Genital tract trauma is the next most common cause of PPH, with up to 70 per cent of women sustaining perineal tears. High vaginal tears or cervical lacerations may require transfer to the operating room for adequate anaesthesia, lighting and assistance. Third- and fourth-degree tears should be repaired in theatre. Uterine rupture after vaginal birth after caesarean may be suspected in a woman with ongoing blood loss despite a well-contracted fundus in the absence of perineal trauma, or if shoulder-tip pain is present.

Tissue

Retained placenta or membranes inhibit uterine contractions and create a nidus for infection. It is essential that the placenta and membranes be carefully inspected for completeness, with care to exclude a retained cotyledon or succenturiate lobe. A partially separated placenta may cause rapid blood

Table 3. Uterotonic doses and administration.

Uterotonic	Dose	Route	Side Effects	Contraindications
Syntocinon	10 units May be repeated	IM or IV	Hypotension, nausea, vomiting, water intoxication	Hypersensitivity to oxytocin
	40units in 1L NaCl 0.9% or CSL, 250ml/hr	IV infusion	Hypotension, nausea, vomiting, water intoxication	Hypersensitivity to oxytocin
Ergometrine	250µg, up to max of 4 doses (1mg)	IM or IV	Hypertension, nausea, vomiting, tonic uterine contractions	Severe hypertension, cardiac disease, hypersensitivity to ergometrine
Syntometrine	1ml (Ergometrine 500µg + oxytocin 5 units) May be repeated x2	IM	Nausea, vomiting, hypertension	Severe hypertension, cardiac disease, hypersensitivity
Misoprostil	800–1000µg	PR/Buccal	Nausea, vomiting, diarrhoea, abdominal pain, pyrexia	Hypersensitivity to misoprostil
Dinoprost (PGF2α)	0.5mg Repeat doses x6 to max 3mg	Intramyometrial	Bronchoconstriction	Severe asthma and cardiac disease
Carboprost (15-methyl-PGF2α)	250µg Repeat every 15 mins to max 2mg	IM or intramyometrial	Bronchoconstriction, hypertension, nausea, vomiting	Hypersensitivity, active cardiac, pulmonary, renal or hepatic disease

Table 4. Blood product transfusion targets in major PPH.[6]

	Target	Indication for Treatment
Red blood cells	Hb >80	Combined clinical and haematological assessment Almost always required when Hb<60 & almost never required when Hb >100; however, Hb can be initially normal in acute haemorrhage
Platelets	Platelet count >50 x 10^9	Platelets should be transfused when platelet count is <75 x 10^9/l to maintain platelet count >50 x 10^9/L
Fresh frozen plasma	APTT/PT<1.5 times normal	After 4 units PRBC, if no haemostatic test results available and bleeding ongoing 12–15ml/kg appropriate If APTT/PT >1.5 times normal, quantities in excess of 15ml/kg likely required Consider earlier if coagulopathy suspected i.e. abruption, amniotic fluid embolus, HELLP syndrome
Cryoprecipitate	Fibrinogen >2g/l	Fibrinogen <2g/l associated with progression of bleeding and increased need for blood products & invasive procedures 2 pools of cryoprecipitate should increase fibrinogen by 1g/L Note median Fibrinogen at term approx. 5g/L

loss. Transfer to an operating theatre is required for provision of anaesthesia, so that complete examination and removal of tissue can be achieved. Morbidly adherent placentation should be considered if a placental-myometrial plane cannot be found at time of manual removal, and additional skilled assistance sought.

Thrombin

Coagulopathy may be a cause or a result of PPH. Women with a known bleeding diathesis should be antenatally discussed with a haematologist and a clear intrapartum and postpartum plan documented. Early involvement of blood bank and haematology services are essential in cases of major or ongoing PPH.

Point-of-care coagulation testing, including TEG (thromboelastography) and ROTEM (rotational thromboelastometry), is increasingly being used in the management of major PPH. Initial results may be available within as little as five minutes to guide administration of clotting factors and blood products. Point-of-care testing has been shown to reduce the requirement for blood component therapy when compared to empiric replacement.[6]

Tranexamic acid (TXA) has a well-defined role in the field of trauma surgery; however, its role in obstetric haemorrhage has been less clearly defined. Initial studies suggested that TXA may reduce total blood loss, fall in haemoglobin and need for blood transfusion;[7] however, a Cochrane Review found that trials testing the effectiveness of TXA in obstetric haemorrhage were too small to draw meaningful conclusions.[8]

Recent publication of the World Maternal Antifibrinolytic Trial (WOMAN) has shed more light on the utility of TXA in obstetric practice.[9] WOMAN sought to evaluate the effect of TXA in PPH on mortality and hysterectomy. Eligible women with a clinical diagnosis of PPH received 1g of TXA via slow intravenous (IV) injection after randomisation. If bleeding was ongoing after 30 minutes, or

recommenced within 24 hours, a further 1g dose was given. WOMAN demonstrated a significant reduction in deaths from bleeding, particularly when TXA was administered within the first three hours. Importantly, there was no increase in adverse events (such venous thromboembolism) compared with placebo. In light of these findings, one anticipates more widespread use of TXA in obstetric settings to follow.

Theatre

The operating theatre is undoubtedly the appropriate environment to manage any major PPH. Early recourse to definitive surgical management should be considered in the unstable woman where medical management is ineffective. The UK Confidential Enquiry into Maternal and Child Health repeatedly cites delay or failure to perform hysterectomy as an avoidable cause of maternal death from PPH.[10]

Fertility-preserving management options in theatre include:

- Intrauterine balloon tamponade such as Bakri Balloon. Using warmed fluid to fill the balloon is advantageous as it accelerates the clotting cascade
- Uterine compression sutures, such as B-Lynch suture, using an absorbable monofilament suture, such as Monocryl
- Arterial ligation of uterine or internal iliac arteries greatly reduces uterine blood flow. Care to avoid ureters and other vessels when operating on the pelvic sidewall is necessary
- Arterial embolisation via interventional radiology where facilities are available

A consultant obstetrician should be involved in all decisions regarding peripartum hysterectomy, ideally in consultation with another senior consultant.

Outcomes and follow-up

Appropriate clinical monitoring in the postpartum period is essential after PPH as there are multiple possible sequelae that may carry significant morbidity, such as acute renal failure, Sheehan syndrome, ileus and venous thromboembolism.

The experience of PPH may be traumatic for mothers and their families. Those involved in managing the PPH should debrief the woman and family as required, with low thresholds to involve appropriate specialist perinatal mental health support. The provision of a follow-up outpatient appointment to answer any further questions, follow-up investigations and to plan future pregnancies is invaluable.

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Maternal collapse

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Maternal collapse is rare in Australia and New Zealand, and maternal death even rarer. Not all maternal deaths are preceded by an identifiable collapse, and not all maternal collapses result in death. Maternal collapse occurs any time during pregnancy, up to 42 days following delivery and is an acute event involving cardiorespiratory systems and/or brain, resulting in impaired consciousness or death.[1]

Maternal deaths are generally quantified as a maternal mortality ratio (MMR), expressed as the number of maternal deaths per 100,000 women giving birth. It includes deaths that occur due to complications of the pregnancy (direct deaths), and those resulting from worsening of other disease processes due to the pregnancy (indirect deaths). Deaths that occur from causes completely unrelated to pregnancy or birth are termed incidental deaths, and are not included in calculation of the MMR.

The MMR in Australia in the period 2008–12 was 7.1,[2] and in New Zealand, for the period 2011–13, was 16.8.[3] While these numbers are thankfully low, the numbers of women who will collapse and require resuscitative care will clearly be higher. Most obstetricians working in Australia and New Zealand will not be directly involved in a maternal death, but many of us will be involved in a maternal resuscitation due to either an arrest or a non-arrest collapse. This is a 'high stakes' situation, where the life of both a young woman and her unborn child, or of a brand-new mother, may depend on our ability to remain calm and focused, to remember the modifications required to basic and advanced life support, and to consider all differentials and manage appropriately.

The leading causes of direct maternal death in Australia and New Zealand include thromboembolic disease, obstetric haemorrhage, hypertensive disease, amniotic fluid embolus and sepsis. Indirect deaths are most often attributable to cardiovascular disease and psychosocial causes; the latter includes suicide, drug and alcohol use, and domestic violence. It is vital to acknowledge and address the disparity for the Indigenous populations in our countries. In Australia, the MMR for Aboriginal and Torres Strait Islander women is twice that for non-Indigenous women. In New Zealand, the MMR for Māori and Pacific women is 2–3 times that for other women.

Several other risk factors for maternal death are recognised. These include:

- Maternal age 35 and older
- Obesity
- Lower socioeconomic status
- Pre-existing mental health issues, substance use and domestic violence, all of which may be exacerbated by pregnancy and the puerperium
- Medical co-morbidities, particularly asthma, autoimmune diseases, inflammatory and atopic disorders, haematological disorders, essential hypertension, infections and musculoskeletal disorders

One of the important developments in improving identification of a pregnant or postnatal patient at risk of collapse during hospital admission has been the development of maternity-specific Early Warning Charts. These charts for regular observations consider the altered physiology of pregnancy, and provide clear guidelines for when observations fall outside the realm of expected or acceptable, thereby triggering an alert to the responsible obstetrician. These charts make recognition of a deteriorating maternity patient much easier, allowing timely medical intervention. All units responsible for the care of pregnant and postnatal patients should have such charts available and in use.

As for all cases of collapse, the initial resuscitation must follow the usual ABCs.

- **Get help**
- **Airway**
  - Ensure open by correct positioning of patient
- **Breathing**
  - If no respiratory effort, initiate basic life support (BLS)
  - Assess respiratory rate, check pulse oximetry
  - Use high flow oxygen
- **Circulation**
  - If no pulse, initiate BLS
  - Assess pulse, blood pressure, capillary return
  - Large-bore intravenous access, fluid resuscitation, take appropriate bloods
  - Proceed to advanced life support (ALS) as required.

In any patient collapse scenario, a primary and secondary survey both need to occur alongside the ongoing resuscitation. A few modifications of these surveys should be remembered for the pregnant and postpartum patient. Primary survey of the head, heart and chest proceeds as normal, with abdominal assessment including uterine size, evidence of fetal life, and determination of need for immediate delivery. Vaginal assessment is also added to the primary survey, with blood loss, trauma and stage of labour all being important. The secondary survey will include information gathering about the patient history and the circumstances surrounding the collapse, continued review of the examination findings including vital observations, initiation of appropriate investigation, and refining of the differential diagnosis with commencement of targeted therapy.

When faced with an acute maternal collapse, it is helpful to think of potential causes as falling into five categories, or the 5 Hs for simplicity:[4]
Head including eclampsia, stroke, epilepsy, vasovagal
Heart including myocardial infarction, arrhythmia, cardiomyopathy, thoracic aortic dissection
Hypoxia including pulmonary embolus, pulmonary oedema, anaphylaxis, asthma

Haemorrhage including abruption, uterine atony, genital tract trauma, uterine rupture, uterine inversion, ruptured aortic aneurysm
wHole body and Hazards amniotic fluid embolus, hypoglycaemia, trauma, anaesthetic complications, drug reactions (illicit or prescribed), sepsis

The likelihood of any one of these being causative will obviously depend somewhat on the timing of the collapse – early or late pregnancy, intrapartum, immediately postpartum, remotely postpartum.

Maternal cardiac arrest represents a small subset of women affected by maternal collapse. The incidence is approximately 1 in 30,000 ongoing pregnancies, with a high likelihood of death for both the mother and the fetus. The vast majority of us will never need to attend a maternal cardiac arrest, and doing so is uniquely stressful. For these reasons, it is important to have a framework in mind of how to deal with a maternal cardiac arrest, and to have practised the response to this situation.

Many changes of pregnancy may adversely affect attempts at resuscitation:

- The enlarged gravid uterus can cause aortocaval compression with the patient lying flat on her back, resulting in reduced return of blood to the heart and therefore reduced cardiac output.
- Pressure from the uterus will splint the diaphragm, the extent depending on gestation, with subsequent increased pressure required for successful ventilation.
- Increased breast tissue will reduce chest wall compliance and make ventilation more difficult.
- The fetal haemoglobin circulating in the fetus and placenta has a higher affinity for oxygen than adult haemoglobin, which is an adaptation designed to ensure optimal fetal oxygenation. In the setting of maternal resuscitation, however, this allows the fetus to 'steal' oxygen from the mother, meaning oxygen delivery to the maternal brain and myocardium is less efficient than in the non-pregnant patient.
- Increased intra-abdominal pressure, delayed gastric emptying and increased laxity of the lower oesophageal sphincter combine to increase the likelihood of reflux, and therefore aspiration, of stomach contents.
- Decreased chest wall compliance combined with increased mucous membrane swelling and fragility result in greater difficulty with intubation.
- Increased plasma volume of pregnancy is associated with a dilutional anaemia and subsequent reduced oxygen carrying capacity.
- A combination of changes in respiratory and metabolic functioning makes acidosis more likely to develop, and to do so more rapidly, meaning resuscitation needs to be even more efficient than usual.

For these reasons, there are modifications to routine resuscitation protocols that must be introduced when dealing with a cardiac arrest during pregnancy:

- Left lateral displacement of the uterus reduces the degree of aortocaval compression and thereby maximises cardiac output. This is most simply achieved manually, with one member of the team using a hand to push the uterus to the side while the mother is supine. Use of a wedge or other device to tilt the maternal pelvis may also be advocated, but can potentially also tilt the thorax and thereby reduce the efficiency and utility of cardiac compressions.
- Consideration of expediting delivery. If the patient is in labour and fully dilated, this may be most speedily achieved with forceps, but generally is most likely to require a perimortem caesarean section (PMCS). The benefit of PMCS to maternal survival is greatest if delivery is achieved within five minutes of arrest, so the procedure must commence by the four-minute point, and should be considered a possibility from the moment of the arrest. It is advisable that all units have a PMCS kit available both on the maternity ward and in the emergency department, or anywhere else that a maternal cardiac arrest is more likely to occur. This essentially only requires a scalpel and a clamp for the cord, the latter to prevent neonatal exsanguination if the baby is alive at birth. It is important to remember that the procedure is being performed for the benefit of the mother, not the fetus, but delivery may also improve the likelihood of neonatal survival. It is imperative that the neonatal team, or the person/team responsible for neonatal resuscitation, is called by the time the decision has been made to proceed to delivery.

One very simple way of ensuring a smoother response if a maternal collapse does occur on your unit is to have regular drills. Everyone working in the area, and everyone who may attend a maternal cardiac arrest call, should know where the emergency equipment is for your ward, including the PMCS kit, and should know how to apply and initiate the defibrillator. Good teamwork is vital in the event of any resuscitation, but even more so in an environment where arrest occurs infrequently and where stress levels will be even higher than in most other arrest scenarios. Many maternity units run regular drills for obstetric emergencies, and it is vital to include maternal collapse in these scenarios. Programs such as the PROMPT course are invaluable in educating staff members from all areas regarding the importance of teamwork, knowing the protocols, equipment and expectations for your unit, and the benefits of drills.

Maternal collapse is a sobering topic, with significant potential for complacency in our privileged setting of low maternal mortality. It is likely that as the obstetrician on the scene, we will be looked to as a leader in the event of maternal collapse or arrest, and it is vital that we are all educated about how to deal with this. We also have a duty to ensure every other obstetrician, midwife, paediatrician, nurse, anaesthetist, intensivist, orderly and anyone else who will respond to a maternity arrest call is aware that there are modifications required for BLS and ALS in the pregnant and immediately postnatal patient, and that teamwork is vital to achieving the best results. Increasingly, we also need to be aware of screening for risk factors that must occur antenatally, and the risk stratification and harm minimisation strategies that may be of use in some at-risk groups. As with everything in obstetrics though, one of the biggest challenges with maternal collapse is the unpredictability, and the need for constant vigilance.

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After the event: debrief to make a difference

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An emergency code is called, you work together effectively as a team, the woman is stable, the family well informed, but what are you now thinking and feeling? There does not need to be a poor outcome in practice for us to question the care provided, relive the events and worry about what could have happened or what our team think of us. It is most likely that we will keep all these thoughts to ourselves as we perceive others are moving on, remaining emotionally strong to care for the next woman. We may have decided we are more sensitive than others in our team or that it is our own competence that is in question. This article will outline the common responses after a critical incident, such as a code event, and what has been found to be helpful for us and our colleagues. The information is informed by international literature and an action research study undertaken with health professionals at National Women's Health in Auckland from 2014–16.

Common responses to critical incidents

Within women's health there is a wide range of events that can be considered critical or traumatic; responding to an emergency code is one of them. Some are perceived to be more stressful than others depending on a multitude of factors, such as connection with the woman, what has gone on before, the health professional's role and the outcome. A relatively minor event can have an unexpected impact. Common emotions include shock, despair, anxiety, guilt, shame and fear.[1,2] A study of 365 obstetricians in the USA found 53.7 per cent experienced a high level of grief following a stillbirth and other responses included self-doubt, depression and self-blame.[3] Critical events will continue to occur; as compassionate health professionals the impact will always be significant at some point in our career. This study explored what could make a difference for health professionals after being involved in a critical incident at National Women's Health, Auckland. Fifty health professionals worked collaboratively to develop and evaluate a support package that could facilitate wellbeing following a critical incident. The result was an understanding of what can work in practice and the creation of a Critical Incident eBook available on the National Women's Health and Health Quality and Safety Commission websites.

Gathering together – to debrief or not

Debriefing is often the focus of organisations when looking for support strategies. The reality in healthcare is that debriefings are frequently difficult to organise. In the 21st century, we have the opportunity to be more creative in the way we provide what is helpful after critical incidents using technology to create virtual gatherings, online discussions and resources. There are a variety of activities currently referred to as debriefing. The literature is unclear on the benefits of psychological debriefing and the authors of a Cochrane Systematic review caution about mandating its use.[4] As a form of learning and team building, studies are indicating that structured debriefings can have an impact on patient safety.[5,6] This study found that it is not the debriefing that should be the focus, but rather it is the characteristics and qualities demonstrated in interactions that are powerful in assisting health professionals. Important qualities of all interactions after critical incidents, including debriefing, will be discussed in the next sections.

Be open about the impact of critical incidents

Role modelling of openness about unexpected outcomes and how they make us feel is needed to change the expectation that emotions remain hidden. Interviews with health professionals at National Women's Health uncovered silence around the impact of critical incidents. Members of all professional groups were found to presume they were the only ones experiencing stressful reactions, a finding similar to other studies.[1] This belief led to a generalised behaviour of keeping feelings and thoughts hidden at work, expressing them only in private or with trusted family/friends. The organisation of a debriefing was validating for the participants in the study as it made them aware that others were also impacted. Senior health professionals were found to require as much support as more junior members with one stating, 'I try to look after my team, but who looks after me?'

Learning environments without judgement

Individual blame has little contribution to improving safety when working in a complex organisation where our intent is to provide the best care possible. A requirement to heal after a critical incident is to clearly understand what happened, why and what could have been done differently. A well-organised debrief can achieve this. Most people, given the right environment to gather the facts and reflect, are able to identify their own areas for improvement going forward. In conversations with colleagues one needs to avoid the blaming discourse, such as 'Did you do this?' or 'Why did you...?' but instead offering 'Tell us what happened'. In a group meeting or one-to-one

discussions, take notes of ideas for change and make them a reality.

Provide professional reassurance

Providing reassurance that colleagues remain valued team members is essential. It is not to dismiss conversations of accountability for actions, but rather acknowledges the self-doubt that poor or unexpected outcomes can bring. After a significant event there can be the internal dialogue that begins to question our competence to keep practising. A common concern after a critical incident is reflected by this participant's statement that they 'would worry about being incompetent and having missed something.' There is also concern about what colleagues think. Feelings of shame can immobilise us to seek help, from each other or formally.

Facilitate time out

Taking time away from the workplace may be part of moving forward, a need that is often recognised by others before the individual concerned. Many safety analogies are taken from the airline industry. However, when it comes to continuing to practice after a traumatic event in health, unlike the airline industry, it is expected that health professionals move on to the next woman without hesitation. Although often impractical, there are many senior health professionals who can remember a time in their career when space was needed, space that created resilience in the long term. As one participant in the study stated, 'I had a couple of weeks off work, which I'd never done before or since.' Having space, however, may be just a coffee in a quiet room or having a colleague listen at the end of the day. During a debriefing, acknowledge and offer what is most needed.

Access information going forward

The absence of information about what happens next creates unnecessary fear and unhelpful assumptions. A debrief can be a time for team members to gather information on what will happen next. Will there be an internal investigation? If so, what sort and what will it involve? Knowing the policy requirements of an organisation and triggers for a review can remove the perception that it is being undertaken to establish blame. Health professionals involved in a review should be facilitated to provide their account of both the story of what happened and the analysis of how (or if) care could have been different. Information for ongoing support should also be made available, such as via Employment Assistant Programs, in a way that is not linked to weakness but to ongoing wellness.

Conclusion

Most health professionals keep quiet about the effects of critical incidents and this creates an environment where common needs remain hidden. This behaviour is adopted by new practitioners, perpetuating what appears to be an unsupportive environment. Whether it is a formal debriefing or a casual encounter with colleagues, we need to acknowledge the effect of what has happened to each other and create safe places to learn and change practice. In complex, busy health organisations, innovative ways may be required to gather groups together. However, facilitating positive support is possible in all interactions.

Further reading

The Critical Incident eBook can be accessed via http://nationalwomenshealth.adhb.govt.nz/health-professionals/critical-incident-e-book.

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PROMPT in New Zealand

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'One of the most pressing challenges facing modern organisations is the need to deliver safe and reliable services under conditions of considerable complexity, change and surprise.' Carl Macrae 2016[1]

Over the past 15 years, PRactical Obstetric Multi-Professional Training (the 'PROMPT' course) has become firmly established as a resource for improving organisational safety and resilience in maternity care. In the UK, PROMPT training has been adopted by about 85 per cent of maternity units and, although two very different paths to implementation have been used in Australia and New Zealand (NZ), there is every possibility that with time similar levels of uptake will also occur in Australian and NZ birthing units. This article reviews the development of the PROMPT course in NZ, compares our progress with Australia and considers some of the challenges ahead.

PROMPT began in Bristol, UK, 15 years ago and NZ was an early 'test-centre' for the course. The UK faculty visited NZ in 2005 to run a Train The Trainer (T3) Course in Auckland shortly before the publication of the first edition of the UK course manual and the development of a 'Course in a Box', containing a trainer's manual and all course resources. The first Australian T3 course was run in 2010 in Victoria, with an initial pilot program funded by the Victorian Managed Insurance Authority (VMIA). Since 2012, the PROMPT program has been delivered in Australia and NZ by RANZCOG under licence from the PROMPT Maternity Foundation (PMF) UK.

PROMPT has become established in both countries using different models; a 'mentor model' is used in NZ, while a series of one-day T3 courses is used in Australia. In 2013, a local Australia and NZ version of the PROMPT course manual and 'Course in a Box' was published, based on the second UK edition of the program materials, with the process to be repeated when the third UK edition is released for publication in late 2017.

By the end of 2016, T3 courses had been rolled out to all Australian states and territories. A total of 30 T3 courses have been held and 118 Australian facilities nationwide have undertaken T3 training. At a typical T3 course, a hospital will send a multi-disciplinary team of midwives, obstetricians and anaesthetists (between four and six, depending on the size of a unit). This team will then form the attending unit's future multi-disciplinary faculty. The RANZCOG T3 faculty

Box 1. Characteristics of a PROMPT course

- All staff involved in intrapartum and maternity care within a unit attend; it is not an 'expert' course. All courses are multiprofessional, both among the attendees and faculty.
- All staff should attend regularly with the aim of attendance reaching 100 per cent within a unit. PROMPT is not a 'once a career' course. Using a real work setting ensures staff know where equipment and medication is kept, and how it is used.
- Simulations are run in-situ on labour ward or a typical place of occurrence for the simulated emergency. A Sim-centre is not used.
- Patient actors are used to ensure interaction between the attendees and sick patient. Expensive whole-body mannequins are not used.
- There is an emphasis on high-fidelity simulation and, wherever possible, real drugs and equipment are used. Simple props are used to simulate blood loss and allow fluid and drug administration.
- There is reflective feedback with one team participating in the simulation and another observing, taking structured notes on clinical and teamworking issues. Debriefing sessions are used after each drill to explore what went well and why, as well as what could be improved and how.
- Running simulations in a real work setting allows staff to test protocols, hospital systems and real-time requests for supplies, such as blood products, medication or operating theatre access. The course can be used to develop standardised processes and tools, such as emergency boxes and protocols for managing particular emergencies.
- There is a strong emphasis on the non-technical skills needed to manage an obstetric emergency, exploring how effective communication, teamworking and situational awareness can increase the effectiveness of multi-disciplinary care in an emergency.
- The course is always locally adapted so that local protocols, equipment and staff are used. The course can be run equally well in a tertiary centre or a midwife-only birthing unit.

Figure 1. Managing a simulated postpartum haemorrhage on labour and birthing suite.

have been drawn from a multidisciplinary core of experienced PROMPT teachers and their commitment to the course has been significant, with some facilitating three or four T3 courses across various states annually.

The Australian courses are delivered in local Sim-centres. This has been mainly because of the logistical challenges of running T3 courses within a busy labour and birthing unit. As well as simplifying course organisation for the T3 faculty, it has also had the unintended benefit of convincing most attendees how much easier it is to provide a locally relevant high-fidelity simulation experience in-situ within a birthing unit rather than off site in a Sim-centre. This model does have some significant costs, with each attending unit having to fund attendance at the T3 course (typically about $AU6000 per hospital, plus travel and accommodation for attendees if required). Funding for individual units has come from the Australian Government, state insurers, the State Department of Health or from hospitals themselves. The great majority of those 118 that have attended a T3 course are now running PROMPT training.

In NZ, we have used a mentor model with no T3 courses being run. This has been partly due to an absence of government or insurer funding for units to attend a T3 course and, partly, our much smaller number of birthing facilities making a mentor model more robust and still relatively sustainable. NZ has only six tertiary-level units, 18 secondary-level birthing units and approximately 45 primary midwife-only birthing units (some of these having less than 30 births per year).

Under the mentor model, units send a multi-disciplinary team to attend a PROMPT course in a tertiary centre, thus allowing the potential faculty to both experience a course as attendees and assess how the program might be implemented in their own unit. Faculty from the supporting tertiary unit then travel to help that unit run their first course by supervising them setting up the drills, providing help with adapting slides and lectures for local use and often both delivering some of the introductory lectures and leading some debriefing sessions. Initially, all interested units attended a course in Auckland, but in recent years both Dunedin and Christchurch have provided support to other secondary units and both tertiary and secondary units across the country have helped set up courses in the primary birthing units that they potentially receive referrals from. This more organic approach has presented some challenges, particularly initially with the Auckland faculty visiting almost all of the country's secondary and tertiary birthing units over a three-year period, but this burden has lessened as 'local champions' in tertiary and secondary level units have gained more experience in running the course and have felt comfortable helping other nearby units set up or train new faculty to run PROMPT courses.

Now, in 2017, all NZ tertiary units are running regular PROMPT training, with all except three of our secondary level units running regular PROMPT programs. Many of the secondary level units also support course faculty in local midwife-only units. A total of 380–390 PROMPT courses have now been run in NZ, with nearly 1500 course manuals purchased. Establishing how many individual midwives and medical staff have attended a course is more difficult, but with course sizes ranging from 12 to 30 attendees, it is likely that there have been well over 5000 individual attendances at a PROMPT course in NZ.

It appears that both approaches have been similarly successful in disseminating PROMPT training, but there are some significant challenges for PROMPT ahead. Our three most important challenges are:

1. Maintaining the fidelity of the course, as it is locally adapted by multiple units
2. Sustaining the course, both in individual units and nationally
3. Funding the course and demonstrating to potential funders that the course is cost-effective

Course fidelity

One of the most important aspects of PROMPT training that differentiates it from offsite or expert courses, such as ALSO and MOET, is an emphasis on the course content being adapted to use local protocols, facilities and equipment, with the program also being delivered by a local faculty. There is potential for the quality of a course to deteriorate as local faculty change or lose enthusiasm. Smaller units will continue to need support from time to time from tertiary centres to train new faculty and ensure course fidelity is maintained. Funding to implement the T3 model of course delivery nationally in NZ is likely to be

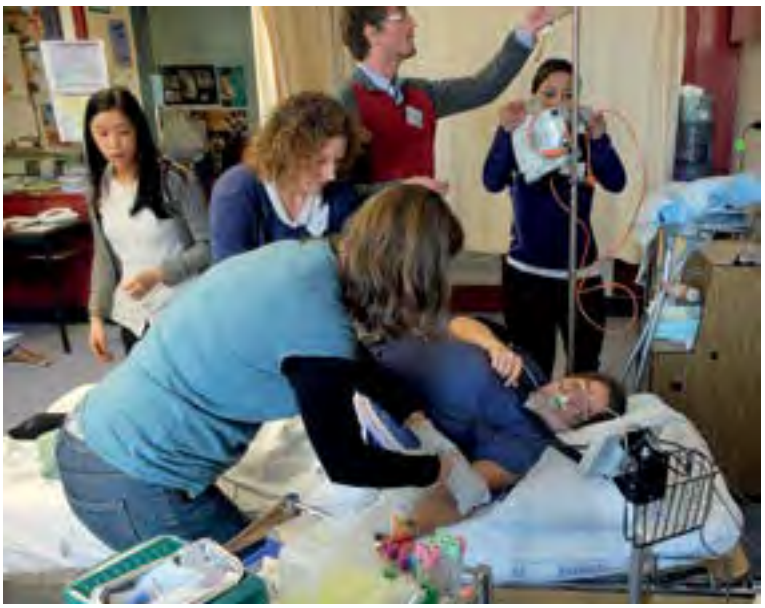

Figure 2. The early stages of a maternal collapse simulation. The team will be moved on to an adjacent mannequin if the actress expires and requires CPR.

difficult; however, funding for new faculty in smaller centres to visit larger units and mentors to assist those smaller units running their own courses would help maintain course fidelity.

Sustaining PROMPT

PROMPT faculty across NZ have reported variable levels of support from maternity management and interest from senior medical staff. The program very much relies on a local clinical champion and committed midwifery educators to maintain enthusiasm and fight for training to be prioritised in times of staff shortage and funding shortfalls. The Perinatal and Maternal Mortality Review Committee (PMMRC) have recommended that all staff providing intrapartum care attend regular multidisciplinary training in the management of obstetric emergencies; however, there is no obligation for any unit to fund or support such training, and as a result, faculty from across the country have at times struggled to continue providing PROMPT training. There is scope for improving local sustainability with more support from a national NZ PROMPT faculty.

Funding and cost effectiveness

One of the biggest challenges PROMPT faces is funding. An expensive offsite or expert-only course attended by two or three staff a year is relatively cheap for a unit to support, but PROMPT – with its underlying philosophy of all staff being trained, being trained together and being trained regularly – is potentially much more costly to implement.

One recent UK study,[2] using a micro-costing technique, reported that PROMPT costs €22,000 ($AU 31,000) per 1000 births if 85 per cent or more of all medical and midwifery staff are trained every year. Over 90 per cent of these costs were from back-filling midwifery and medical shifts. A reduced frequency of training or using staff study leave funds would reduce this cost, but could potentially lead to a reduced uptake of training and a reduced effect on improved clinical outcomes. A further challenge for NZ is that a substantial proportion of intrapartum care is delivered by self-employed independent practitioners, leading to debate in many units about whether they should be charged to attend such training or if it should be mandatory and free for all practitioners providing intrapartum care within a birthing facility.

A key question for potential funders is whether or not in-situ simulation training actually 'works' and whether there is any evidence that it improves clinical outcomes (Kirkpatrick level 4 evidence), rather than just improving staff knowledge or morale. There is now reasonably robust evidence that PROMPT training can significantly reduce the proportion of cases of shoulder dystocia complicated by a brachial plexus injury,[3] reduce the decision to delivery interval for category-one caesarean section,[4] reduce the incidence of five-minute Apgar scores of less than five[5] and reduce litigation costs for insurers.[6,7] There is also increasing evidence that in-situ multi-professional training, incorporating teamwork as in PROMPT, is more effective than offsite training or training in single professional groups.[8,9]

In NZ, we are in the process of surveying our entire PROMPT faculty nationally, developing a national website and improving communication between local PROMPT educators to support and sustain the course. We also remain hopeful that, with time, PROMPT training will be free to all participants and embedded in all NZ birthing facilities.

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ALSO: the new two-part landscape

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Advanced Life Support in Obstetrics (ALSO) is a multidisciplinary, maternity emergency course first introduced in Australia in 2001, managed by a not-for-profit organisation, Advanced Maternal and Reproductive Education (AMaRE). ALSO provides a safe and supportive environment for clinicians to learn advanced skills in the management of maternity emergencies, learning with other disciplines. Such multidisciplinary or interprofessional education is an effective way to promote teamwork and collaborative practice, both of which are essential for effective patient care and reducing risks in the complex environment of health services.[1] Many hospitals across Australia are targeting maternity education strategies towards team training for maternity emergencies in order to improve the quality of care provided to women and newborns.

It has been shown that ordinarily, without targeted training, health professionals do not collaborate well together and learning together in a safe and supportive environment offers a possible way to improve collaboration and patient care.[2] Working together effectively often means breaking down traditional hierarchies, and training together is one useful way to achieve team engagement and functionality.[3] Learning together also helps effective collaboration and teamwork.[2,4,5] ALSO provides this opportunity for doctors, midwives and other relevant healthcare professionals within a team outside of the hospital setting, and without the pressures of the clinical environment. In order for team training to be effective, clinicians also need to feel confident in the application of the required clinical skills to actually manage the emergency. ALSO teaches a systematic way to clinically manage a number of maternity emergencies, promoting a consistent and structured clinical approach to management through the use of easy-to-remember mnemonics.

Research undertaken in Australia demonstrated that completion of the original Australian ALSO course had a positive effect on the confidence and perceived knowledge of doctors and midwives to manage maternity emergencies.[6]

In 2014, AMaRE introduced a new course for early maternity trainees, Preparation in Maternity Safety (PIMS), now known as ALSO Part 1. ALSO Part 1 supports beginning practitioners (medical students or interns interested in obstetrics; PGY1 trainees, midwifery students, first year midwifery graduates) by providing supported hands-on learning in a team environment. PIMS uses simulation mannequins and skilled instructors to teach:

- Abdominal palpation, learning the skills to identify presentations and positions and how these relate to gestation and labour progress
- Vaginal examination and how to identify the station, position and cervical dilation as anticipated throughout the various stages of labour
- Speculum examinations for visualisation of the cervix, identification of liquor, how to collect specimens and performance of cervical smear testing
- Alternative birthing positions that support and facilitate normal birth
- Recognition and early management of hypertension in pregnancy with an aim of early identification and escalation
- Discussions regarding the early identification and management of maternal sepsis
- Practical maternal resuscitation using the

Table 1. Who should attend ALSO Part 1 and ALSO Part 2?

ALSO Part 1 PIMS	ALSO Part 2 AIMS
Final-year medical students	Obstetricians
Residents in training	Registrars
GPs in training	GPs
Midwifery students	Midwives, 2nd year and above
New graduate midwives	Flight nurses
	Emergency physicians

defibrillator and learning teamwork and communication skills to manage the emergency
- Neonatal resuscitation skills and training to identify those babies requiring more advanced resuscitation skills, using both bag and mask and CPAP resuscitation
- Postpartum haemorrhage (PPH) management using a team approach to prevent, evaluate and manage a PPH

ALSO Part 1 is devised to be first-stage training in maternity emergency care with a risk identification and preventative approach to the management of maternity emergencies.

In 2018, AMaRE will be launching ALSO Part 2, an updated second-stage maternity emergency course Advancing In Maternity Safety (AIMS). ALSO Part 2 will provide education for those situations where early identification and prevention have proved unsuccessful and a team of maternity clinicians need to come together to manage the emergency. ALSO Part 2 will provide a team-based management approach for experienced maternity clinicians to use simulation equipment to manage maternity emergencies. The course will include:
- Facilitating forceps and vacuum birth and identifying the appropriate timing for use
- Managing PPH, including advanced approaches such as balloon tamponade, bimanual compression and new drug managements
- Managing shoulder dystocia, including axial traction and Zavanelli manoeuvre
- Resuscitating women after eclampsia, maternal collapse, emboli and aneurysm
- Assessing fetal welfare, including growth restriction, placental insufficiency, recognition and management of abnormal fetal heart rate patterns
- Case discussion of severe sepsis
- Labour care for challenging labour and birth cases with a team approach to management and clinical decision-making

If you are beginning your career as a maternity care provider ALSO Part 1 (PIMS) offers the opportunity to perform hands-on practice in a simulated, well-supported environment. For the more experienced practitioner (PGY2 and above), ALSO Part 2 (AIMS) will bring together a team of clinicians to manage extreme maternity emergencies within the simulated environment. ALSO Part 1 has been approved for 16 PD points in the Clinical Expertise category, in the RANZCOG CPD Program.

Registration and further information on both the ALSO Stage1 (PIMS) and ALSO Stage2 (AIMS) are available on the AMaRE website, www.amare.org.au.

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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 'When taking a history from a woman aged 22 years, she tells you that she has been sexually active since she was age 13. Is screening for cervical cancer appropriate?'

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A

The short answer, probably quite unhelpful, is: no and possibly yes. Let me explain. With the introduction of the renewed National Cervical Screening Program (NCSP) in December 2017, the starting age for cervical screening using the new Cervical Screening Test (oncogenic HPV test with reflex liquid-based cytology) has been raised from 18 years to 25 years.[1] So, in this case, the woman in question will not receive an invitation to screen for another three years. Is this appropriate and is it safe practice?

What is the evidence for the new starting age?

Women will not be invited to participate in the NCSP until they reach 25 years of age.[1] In 2005, the International Agency for Research in Cancer (IARC) recommended cervical screening begin at the age of 25.[2] Most countries with an organised approach to cervical screening commence screening at age 25 or 30 years, with cervical cancer incidence and mortality rates that are similar to Australia.[3]

The harms of screening younger women, mainly through overtreatment, far outweigh any perceived benefits, particularly in regard to reproductive outcomes in later life.[4]

Do young women develop cervical cancer?

Cervical cancer is rare in young women, but HPV infection is very common and usually resolves without intervention. Detection of HPV-related cervical abnormalities in younger women has led to unnecessary investigation and treatment in women who are very unlikely to develop cancer.[4]

Although women under 25 years of age have been screened in our current NCSP, this has had no impact on the incidence or mortality from cervical cancer in these women. A recent Australian study considered the effect of screening on the incidence of cervical cancer for different age cohorts between 1983 and 2010, and concluded that the starting age of 25 years is safe for Australian women.[5] In addition, the authors noted that HPV vaccination will continue to cause a significant fall in the number of high-grade abnormalities in young women, making screening of younger women increasingly less effective.[5]

Why even consider screening this young woman?

In the absence of evidence that women who have experienced early sexual activity will benefit from screening under age 25 years, why even consider this approach?

Some health professionals and consumers (women) have expressed anecdotal concerns that women who have been exposed to HPV infection at a young age (13 years and younger) will not be screened until it is 'too late' to prevent the development of a cervical cancer. They consider these women will have had a longer time at risk, unscreened, and may develop cervical cancer before they are eligible to commence screening at age 25 years.

Are these women really at increased risk?

The 2016 Guidelines state: 'There is a lack of currently available evidence to support screening women who have been exposed to early sexual activity.'[4] There is one study, which has provided indirect evidence from re-analysis of individual data from worldwide studies, showing that the relative risk for cervical cancer in women who first had sexual intercourse at age 14 years or younger was similar to the risk in women who had first intercourse at 16–18 years.[4,6]

In a recent national survey of Sexual Health in Australian Secondary Students, a significant proportion of women experience their first sexual intercourse at age 14–16 years, and the median age has increased in recent years to 16–17 years.[7] It is far less common for women to have first intercourse at age 13 years and below, and this is more likely related to sexual abuse.[7]

" Some health professionals and consumers have expressed anecdotal concerns that women who have been exposed to HPV infection at a young age will not be screened until it is 'too late' to prevent the development of a cervical cancer. "

Many, but not all, of these women will have received HPV vaccination prior to sexual debut.

To screen or not to screen, that is the question

Routine cervical screening is not recommended in young women under age 25 years.[1,4] Women who have experienced early sexual activity or have been victims of sexual abuse are considered to be a 'specific population' and are considered separately in the new 2016 Guidelines.[4] Because of the lack of currently available evidence for this 'specific population', the Guidelines have adopted a cautious individualised approach until further evidence is available.

Recommendation 15.2 states that: 'For women who experienced first sexual activity at a young age (<14years) and who have not received HPV vaccine before sexual debut, a single HPV test between 20 and 24 years of age could be considered on an individual basis.'[4]

The emphasis here should be on the phrase 'could be considered on an individual basis', recognising that the evidence for such screening is non-existent at this time. Whether you offer to screen or not will depend on your interaction with the woman, her desires once you have discussed this with her and your personal experience and preference in such cases. You should note that the minimal benefits of cervical screening in young women should be weighed against the increased risk of harm that excisional procedures could have for future obstetric outcomes.[4]

What if she has symptoms?

Women at any age, who have symptoms suggestive of cervical cancer, should have a co-test (HPV and LBC) and be referred for appropriate investigation to exclude genital tract malignancy.[4]

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Examination for chronic pelvic and sexual pain

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Chronic pelvic and sexual pain in women is associated with significant morbidity and financial cost to the individual as well as their partners, families and the wider community. Chronic pelvic pain (CPP) is estimated to affect 15 per cent of women aged 18–50 years.[2] There is a complex interplay of biological, behavioural, environmental and societal factors compounded by complex neurogenic innervation of closely related visceral and somatic structures, by the intimate nature of the area and impact on personal relationships and sexuality. Epidemiologic studies reveal a high community prevalence of chronic pelvic pain in women of reproductive age, with reported rates of 14.7 per cent in the US.[2]

Once a diagnosis of possible pelvic floor dysfunction as a contribution to chronic pelvic pain is made, objective measurements and physiotherapy as a method of low-risk treatment is a logical, inexpensive and nonsurgical approach to treatment.[3] Of patients with chronic pelvic pain, 85 per cent present with dysfunction or impairments of the musculoskeletal system – for example, poor posture and pelvic floor muscle imbalances.[1]

Pelvic floor muscle (PFM) pain and increased tension are commonly associated with pelvic, vulval and sexual pain presentations, and are emerging reasons for referral to pelvic floor physiotherapy. The addition of biofeedback provides the patient with objective information regarding the adequacy of pelvic floor training and objective assessment of changes in the baseline tone and strength for the physician.[3] The relationship between the symptom of PFM pain and the sign of altered PFM tension is not well understood, but co-occurrence is frequently observed with causality difficult to prove. These 'tissue-focused' interventions play an important role; however, there is strong evidence for a biopsychosocial approach to management of persistent pelvic floor muscle pain, owing to the high prevalence of contributing psychological variables.

Both peripheral and central abnormalities have been implicated in vulvar/sexual pain, indicating central hypersensitivity and therefore an inherent need to address central nervous system dysfunction.

Classification

CPP is chronic or persistent pain perceived in the structures related to the pelvis. It is often associated with negative cognitive, behavioural, sexual or emotional consequences as well as with symptoms suggestive of lower urinary tract, sexual, bowel, pelvic floor or gynaecological dysfunction.[5]

The European Association of Urology (EAU), in its 132-page guidelines on CPP, describes various visceral and somatic CPP syndromes according to phenotyping, terminology and taxonomy. The focus is on defining the end-organ dysfunction; a process that is useful for identification of the tissue that may be the primary pain generator in peripheral dysfunction. While useful as a classification schema, a limitation is the frequently observed overlap of many of these diagnoses.[10]

From classification of terminology, to describing the distinguishing features of a condition or syndrome, we can then model treatment effects, based on what we understand is the target tissue of our intervention.

While it is good that a muscular pain syndrome has entered this nomenclature, it doesn't really fit as a urogenital pain syndrome. Somatic pain is known to be quite different from visceral pain and within somatic pain there are differences, such as cutaneous pain versus muscle pain. Much is known about cutaneous sensation, but little is known of muscle pain, or myalgia, in the pelvis. While this table suggests discrete entities of CPP, many of these CPP conditions overlap and co-exist, due to factors such as the complexities of visceral-somatic innervation and neural cross-talk.

Interestingly, PFM pain syndrome is not further defined along this axial system in the table, which suggests much less is understood of it, compared with bladder pain syndrome, pelvic pain syndrome and vulvodynia.

Figure 1. Anatomical illustration of pelvic floor muscles to examine when assessing pelvic floor spasm.

Subjective assessment

Diagnostic and narrative-oriented assessments and clinical reasoning occur simultaneously and each influences the other.

Diagnostic reasoning: biomedically oriented assessment and analysis. This looks at physical impairments, pain mechanisms and pain behaviour, structures and pain sources and pathologies, O&G history, bladder and bowel symptoms in addition to exploring pain with coitus. It explores physical and biomechanical contributing factors, such as other musculoskeletal and neurological factors.

Narrative reasoning: psychosocially oriented assessment and analysis. This is about understanding the patient as a person, their personal story or narrative, their perspectives of their disability/pain experience. It is important to understand beliefs, attributions, coping, emotions, sense of self and future projections.

Collaborative reasoning: is used by expert clinicians. It is a consensual approach to interpretation of results, setting of goals and implementation of treatment. Collaboration leads to 'mutual construction of meaning' that places a high value on a patient's insights into their problem. A transfer of knowledge from the health professional to patient and a shift of power toward the patient then occurs, which reduces distorted perspectives of their situation.

Objective assessment

Objective assessment (for pelvic pain) will incorporate assessment and testing of a range of pelvic muscles, joints, nerves, ligaments, fascia and skin.

Pelvic floor muscle tension/stiffness

It has been suggested that pelvic floor hypertonicity is the factor that may connect certain urological, urogynaecological, ano-rectal and gastro-intestinal conditions with sexual dysfunction and pain.[13] We have known for many years that pelvic floor hypertonus is a component of conditions such as constpation, anismus, irritable bowel syndrome and proctalgia fugax. Patients with dyssynergia tend to empty their bladder by pushing or straining rather than gently releasing their PFM.

A discussion has emerged in the literature regarding the hypertonic pelvic floor and its relationship to CPP, especially sexual pain conditions. Pelvic floor pathophysiology in vaginismus, dyspareunia and pelvic pain is commonly hypertonicity.[13] In a Canadian study, 90 per cent of women with vulvo-vaginal dysfunction had pelvic floor dysfunction.[12] Pelvic floor pathology is likely to play a significant role in the maintenance and exacerbation of sexual pain via reactive muscle guarding, tissue restriction due to hypertonicity and lack of vaginal muscle control. Increased passive and active tension in the PFM leads to tissue ischemia and irritation of the pelvic nerves.

Assessing the pelvic floor muscles

History and physical examination underpins diagnosis and treatment of chronic pelvic pain. Gynaecologists are familiar with assessment and treatment of pelvic floor laxity, but have very limited knowledge in the assessment and treatment of pelvic floor spasm, tension, tone and pain for gynaecological symptoms.[4] Pelvic examination to investigate acute or chronic pelvic pain should always include single-digit palpation of at least the perineals, levator ani, piriformis and obturator internus muscles.

Begin by palpating the introitus to rule out vaginismus. Examine the hymenal remnant very gently, and make sure it is not causing pain. If not, then directly beneath the hymenal remnant is the bulbospongiosis (Figure 3), most often tender at 3 o'clock and 9 o'clock. Push at these points firmly and steadily. Then move internally and examine pubococcygeus from attachment to insertion, paying special attention to 4 o'clock and 8 o'clock which is where most commonly there are muscle trigger points.[6] Spasm of a portion of the levator ani is often detected as a palpable band resembling a guitar string within the muscle or a focal trigger point. To examine for piriformis, press posterolaterally and superiorly to the ischial spine.[6] Then use your left hand to examine for the left obturator internus, getting the patient to push their left knee into your right hand to put the muscle under tension and reverse the hands for the other side. Each time you examine an area ask if it reproduces the pain the patient experiences. Ask the patient to contract the pelvic floor muscle then relax the muscle. Often they do not move the muscle at

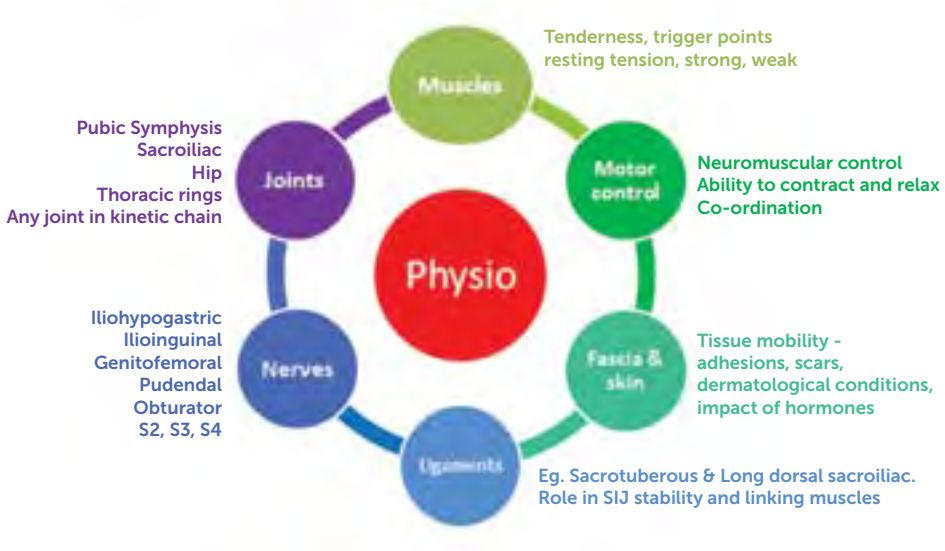

Figure 2. EAU classification of chronic pain syndromes.

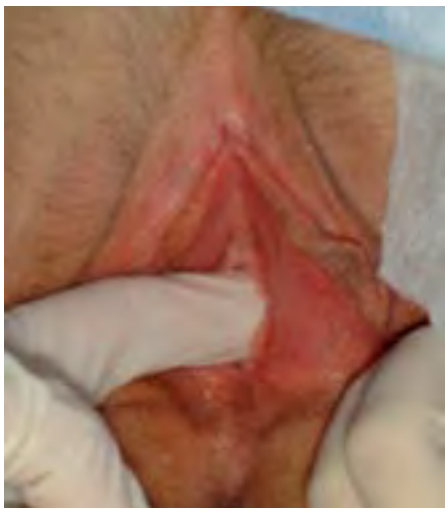

Figure 3. Examination of the bulbospongiosis.

all as the resting tension is so high. Another typical finding during examination is a distinct asymmetry between the right and left elements of the pelvic diaphragm. This shortening or contracture will usually be ipsilateral to the patient's pain.

Best-practice management

It is essential that women with chronic pelvic and sexual pain are treated by a multidisciplinary team of healthcare professionals to enable a thorough assessment and an individualised treatment plan. This team will often include a gynaecologist, pelvic floor physiotherapist, a psychologist, and sometimes a pain medicine specialist. Pelvic floor physiotherapy management is multi-modal, involving a combination of 'hands off and hands on' therapy.[11] Treatment of the pelvic floor muscle dysfunction involves manual techniques such as stretching and internal myofascial release to reduce muscle tension and treat trigger points. Depending on the referral pattern, these techniques can also be applied to piriformis, obturator internus, adductors and abdominals.

A PFM exercise program incorporating biofeedback aims to promote relaxation, control, strength, speed and endurance of contraction. This is performed as a daily home exercise program, often supplemented with the use of a home trainer program for tissue mobilisation and desensitisation.

Pelvic floor physiotherapy also involves a significant educational component including the science of chronic pelvic pain. Pain is an output of the brain, it is altered by thoughts, emotions and attitudes. The level of pain a person perceives is closely related to the level of threat they feel, whether this is real or perceived. When pain becomes chronic, it is no longer due to tissue damage or trauma. It is caused by a sensitive nervous system, and is affected by how the brain processes heightened nerve responses in the context of the environment. 'Explaining pain' is now the cornerstone of modern chronic pain rehabilitation. It is well established in research that pain science education is effective in reducing pain and disability, and establishing healthy attitudes and beliefs about pain. It is also important that psychosocial factors are screened and addressed through therapies such as cognitive behavioural therapy, mindfulness-based stress reduction and general exercise.[9]

Conclusion

PFM dysfunction, mainly increased tension, plays a significant role in the maintenance and exacerbation of pelvic and sexual pain. Identification of a myofascial syndrome as a cause or contributing factor is a critical step in management of patients with chronic pelvic pain. Failure to recognise pelvic floor dysfunction could certainly contribute to the 24–40 per cent negative laparoscopy rate in patients with chronic pelvic pain.[8] CPP is complex, as it is generally a condition with multiple causative factors, that requires a common understanding between the patient, their loved ones and health practitioners. Research shows us that understanding lessens anxiety and can reduce the distress associated with the pain. There are many ways to increase knowledge and minimise anxiety, be it directly or indirectly. Even experienced practitioners may misdiagnose patients with pelvic pain if they do not specifically examine the pelvic diaphragm. Performing a simple musculoskeletal screen along with a pelvic muscle exam takes just a few minutes and adds valuable information to the medical assessment. Attention to the pelvic floor musculature during pelvic examinations is an effective and inexpensive diagnostic strategy that can be life-changing for patients with pelvic pain, yet requires minimal time and effort. Management must be multidisciplinary and take a biopsychosocial approach with an individualised and multimodal therapy application.

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Rabbits, mice and toads: testing for pregnancy

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In a well-regarded textbook published in 1925, the London obstetrician Aleck William Bourne described the methods used at the time to diagnose early pregnancy.[1] Only vaginal examination was thought to be reliable: bimanual palpation of the uterus was used to detect enlargement and also Hegar's sign – softening of the lower segment while the fundus and cervix remained firm. Added to this was speculum examination of the cervix to demonstrate a bluish colour, owing to the increased vascularity of that organ. External signs helped, such as increased skin pigmentation, especially the linea nigra running vertically below the umbilicus (in Caucasian women), and darkening of the nipples and the development of Montgomery's follicles. Symptoms such as amenorrhoea, nausea and vomiting, breast tenderness and food cravings were confirmatory. This had all been the standard teaching for medical students for decades when Bourne published his book.

But change was in the air. In 1928, German gynaecologists Aschheim and Zondek discovered 'a luteininsing gonadotrophic hormone' in the urine of pregnant women. Though the hormone itself, ß-human chorionic gonadotrophin (ßhCG), would not be isolated until the 1950s, they postulated that detection of this substance in the urine of a woman with just a few weeks of amenorrhoea might provide a definite diagnosis of pregnancy. They were right, and together they developed the Aschheim-Zondek test, using immature female mice. The test was as follows:

> 'Five mice 3–4 weeks old and weighing 5–8 grams each are injected subcutaneously twice daily for three days with slightly acidified morning urine in the following amounts:
>
> - Mouse 1 0.2ml at each injection
> - Mouse 2 0.25ml " "
> - Mouse 3 0.3ml " "
> - Mouse 4 0.3ml " "
> - Mouse 5 0.4ml " "

'One hundred hours after the first injection the mice are killed and the ovaries inspected. The presence of one blood point easily visible to the naked eye or with a hand lens and about the size of the head of a small pin is diagnostic of pregnancy and the test is 99 per cent accurate.'[2,3] This was certainly progress, but still a long way off a simple strip from the chemist showing one or two blue lines in the privacy of a woman's own bathroom.

Soon after the discoveries of Aschheim and Zondek, Friedman and Lapham at the University of Pennsylvania experimented with and developed a test using 'virgin female rabbits' aged 12 weeks or more.[4] What ultimately became known as Friedman's Test required that the woman had missed a period by at least seven days. Friedman wrote that the test depended on the presence of large amounts of 'a gonadotrophic substance in the urine, both follicle-stimulating and luteinising' and early morning urine was most likely to have higher concentrations of this substance. One of the authors (CdC) remembers how, as a medical student in Dublin, it was common to see women furtively clutching jars of urine wrapped in brown paper approaching doctors' surgeries just before 9am – there was always a table just inside the foyer of every surgery where the specimen could be discreetly placed. Later that morning the urine was injected into the ear vein of a rabbit; after 36 hours the rabbit was killed and the ovaries examined. Haemorrhage into follicles or the development of corpora lutea were diagnostic of pregnancy.[5] For many years 'the rabbit died' was a euphemism for saying that a woman was pregnant, despite the fact that the rabbit died regardless of whether the test was positive or negative.

In 2016 Louis Tuttle, biochemist at Cairns Base Hospital from the 1950s through to the 1980s, explained to one of the authors (TK) how pregnancy testing developed in Cairns over that time. Louis and his colleague Bill Horsfall initially used the standard test involving female rabbits. The rabbits had to be bred and maintained so that they were ready for immediate testing and this took place in a large Queenslander on what is now the oval of Cairns High School, behind the original Cairns hospital. As the rabbits could only be used once, an ongoing supply was required (and rumours that the rabbits subsequently ended up in rabbit stew are probably correct; rabbit was a dietary staple in rural Australia at the time). The constant demand for rabbits led

Figure 1. Cairrns Base Hospital, 1955.

Louis and Bill to become interested in the possibility of using frogs or toads instead.

Female toads had first been used for pregnancy testing by Hogben in 1930. With Hogben's method, the toads (specifically Xenopus laevis, the South African clawed toad), which were kept in water tanks at around 25°C separated from any male toads, were well fed on lean minced horsemeat until they reached a weight of 60–100g. Toads were less likely than mice to die before they could be used for testing and, unlike both mice and rabbits, they did not need to be killed and so could be used many times, provided they were given a few days rest and kept apart from male toads.[4]

The woman's urine was injected into the dorsal lymph sac or the peritoneal cavity of the toad and 24 hours later, secretions were obtained from the cloaca and examined – even with the naked eye numerous black and white eggs 2mm in diameter could be seen. If the test proved negative it was repeated at least once with another toad.

A further refinement was the male toad test developed by Gailli-Mainini in 1947. In this test, 2ml of 'clean morning urine' was injected into the dorsal lymph sac of the male toad. Just 3–5 hours later a pipette was used to draw up secretions from the cloaca, which were then examined microscopically. If sperm were present, the test was positive. Gailli-Mainini stated that the toads required 10 days rest (segregated from female toads) and feeding on 'worms and cockroaches, although they could be starved for quite long periods' and they could be used many times.[4] It was the male toad test that was ultimately used in the Cairns pathology department.

By the early 1950s, Cairns had an abundance of cane toads (*Bufo marinus*); the cane toad, a native of South and Central America, had been introduced to Australia in 1935 by the Bureau of Sugar Experiment Stations, now Sugar Research Australia, in an attempt to control sugar cane beetles. Louis and Bill decided to try using the male cane toads. They advertised their need for toads to the schoolboys of Cairns and received an enthusiastic response; initially they paid sixpence per toad but later this was raised to one shilling.

The male toads were kept isolated from any female toads for 2–3 weeks before being used for testing. This was found to be long enough for sperm production to cease in *Bufo marinus*. The patient delivered her early morning sample of urine direct to the lab by 9am. It was then spun down and approximately one-eighth of the sample mixed with pure alcohol. This was injected into the back of a male cane toad around 9.30am. The toads were then checked at 3pm and by 5pm a definite result would be obtained. In fact, Louis Tuttle stated that where pregnancy was more advanced and ßhCG levels higher, the result was clearly positive within an hour.

The male cane toad test for pregnancy proved so successful that a distribution network was established from the Cairns Hospital pathology department to other labs around the country. Special wooden boxes lined with straw were constructed; these housed up to a dozen toads that were transported out to Cairns airport for the regular 6.30pm flight south to Brisbane and then to destinations in hospital labs across Australia. It is worth noting that many of us now in the retiring generation of specialist obstetricians probably had the fact of our existence first communicated to our mothers thanks to the services of one of these laboratory toads!

An immunological test for pregnancy was first described by Wide and Gemzell, in 1960, and several

Figure 2. Bill Horsfall and Louis Tuttle, Cairns Base Pathology Lab, 1955.

subsequent researchers demonstrated the accuracy of their method, which was a latex aggutination-inhibition slide test for ßhCG that could be read in three minutes and required no sacrifice of small animals.[6,7,8] This, of course, is the basis for the much less interesting, but freely available and very accurate, measure of ßhCG in the urine that is the basis of the commercial strip pregnancy test so widely used today.

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Case report

Psoas abscess and ureteric obstruction postpartum

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Retroperitoneal abscess formation is a rare complication following invasive abdominal procedures and even less likely to occur following spontaneous vaginal delivery.[1]

Retroperitoneal abscesses pose significant risk to surrounding organs, with the kidneys, inferior vena cava (IVC), adrenal glands, neurovascular pelvic and lumbar structures potentially compromised; hydronephrosis and ureteric obstructions can lead to acute kidney injury and thromboembolism can occur secondary to IVC stasis.[2] Vague symptoms along with subtle clinical findings may contribute to delayed diagnosis, with lack of prompt treatment potentially leading to maternal mortality, secondary to end organ damage or sepsis.[3]

We present a case of a woman who re-presented after a spontaneous normal vaginal delivery with a retroperitoneal psoas abscess leading to acute kidney injury, secondary to ureteric obstruction. This was diagnosed with a computed tomography (CT) and treated with laparoscopic drainage, ureteric stenting and intravenous antibiotics.

Case

The patient was a healthy 30-year-old primiparous woman with a known history, since puberty, of slow transit constipation, which her mother and grandmother also suffered from. She had had several negative colonoscopies through her life and was able to normalise her stool pattern using bisacodyl prior to and during pregnancy. Despite this, she had an unremarkable pregnancy course and went into spontaneous labour at 39 weeks and 4 days. She had a normal course through labour and an effective epidural inserted for pain relief during the first stage of labour. She had an uncomplicated second stage of labour and proceeded to a normal vaginal birth, sustaining a second-degree perineal tear that was repaired in the delivery suite using 2-0 vicryl rapide™ sutures. A low vaginal swab was negative for Group B Streptococcus, and antibiotics were not required in labour.

On day three postpartum, the woman began experiencing severe right-sided abdominal pain. She reported unilateral flank pain, exacerbated by mobilisation. The pain radiated to lower extremities. An examination revealed a palpable mass in her right iliac fossa. A CT scan demonstrated an area of gas posterior to the caecum as well as faecal loading. A colonoscopy was then performed, which showed a small area of pressure necrosis of the mucosa at the splenic flexure, in keeping with constipation, but no perforation. The woman was discharged on day six postpartum.

At two weeks postpartum, the woman re-presented to her obstetrician with significant facial and pedal oedema and headache. Her blood pressure was 150/80mmHg and she was re-admitted to hospital. Her serum creatinine was 115µmol/L, her uric acid was 0.45mmol/L and her spot protein to creatinine ratio was 99mg/mmol, suggestive of pre-eclampsia. She was commenced on Captopril and a renal ultrasound was performed. This revealed a right-sided hydronephrosis that had not been present on her CT scan two weeks before. She was also found to be febrile (38.5°C) as well as having a neutrophilia (17.4 x 10^9) and an elevated C-reactive protein (317).

Diagnostic laparoscopy demonstrated a right retroperitoneal abscess lying deep into the psoas and densely adherent to the ascending colon. The abscess was then drained and dissected. There was no bowel perforation identified at laparoscopy. During the same procedure, cystoscopy and stenting were performed, revealing a tortuous ureter secondary to displacement by the abscess and reactive inflammation of the ascending colon. A 19Fr BLAKE drain was placed in the right paracolic gutter. Abscess cultures grew E. coli sensitive to Ceftriaxone.

She remained on 2g of ceftriaxone daily and subsequently had her nephrostomy tube removed on day five and her right paracolic drain removed on day six post-operatively. Unfortunately, her right flank pain recurred, as did her fevers. A CT scan performed seven days after laparoscopy revealed a discrete fluid collection anterior to the right iliacus muscle measuring 8.1x4.4x3.7cm. A return to theatre was avoided through insertion of a pigtail drain under CT guidance. This drained haemoserous fluid, with no organisms grown on culture, and remained in-situ for four days, during which time she remained afebrile

with daily improvement of symptomatology. She was discharged on oral amoxicillin 14 days post-laparoscopy and more than one month postpartum.

Comment

Although psoas abscess formation is a rare occurrence, this case highlights the significant morbidity with which it may be associated. Mortality associated with psoas abscess has been reported in the literature at 2.5 per cent; however, if there is a delay in treatment, mortality rises to 18.9 per cent.[1,4] Psoas abscesses are described as primary or secondary.[3,6,7] Primary involves haematogenous spread from a known or, more frequently, unknown source. Outside the obstetric population it has been reported most often in intravenous drug users,[7] the most common pathogen being staphylococcus aureus. Conversely, secondary abscess' result from local spread of an infection, for example, from gastrointestinal, renal or musculoskeletal spread. Common organisms include E. coli, streptococcus and enterococcus.[8]

A MEDLINE search (search terms 'psoas abscess' and 'vaginal delivery') identified seven cases in the literature, with this being the first reported case in Australia. The condition was first described in 1881 by the physician Herman Mynter.[5] The aetiology of our patient's abscess formation is not known, given her general health, lack of co-morbidities and no history of intravenous drug use. It is unclear how a healthy patient with such an uncomplicated delivery developed a psoas abscess. In theory, infection from perineal or vaginal trauma could spread retroperitoneally and form an abscess, which may have occurred for our patient. Pudendal anaesthesia has been noted to cause a secondary psoas abscess in the literature; however, this was not used for our patient.[9] Another potential cause is the formation of a pelvic haematoma intrapartum, which subsequently became infected.[10]

Diagnosis is difficult and requires a high level of suspicion. In this case, we highlight the importance of postnatal follow up. Clinically, patients with unilateral flank pain, pain with mobilisation and radiation to lower extremities, should alert clinicians to the possibility of a psoas abscess. Threshold for imaging these patients should be low, especially if patients remain persistently febrile on antibiotics. CT scanning has been shown to be more than 80 per cent specific in diagnosing a psoas abscess and, although ultrasound has a role in diagnosis, its lower specificity can potentially hinder management decisions.[3,4]

Even though psoas abscess as a complication of spontaneous vaginal delivery is rare, it is associated with potentially significant morbidity as well as mortality. Clinicians who encounter symptoms similar to that presented in this case, including unilateral flank pain, pain with mobilisation and radiation to lower extremities should be mindful to exclude this diagnosis. Initiation of broad-spectrum antibiotics and expedited drainage, whether under radiological guidance or laparoscopically, should be arranged if this diagnosis is made.

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The leg-up

Your regular legal update to keep you up-to-date with medicolegal issues in the practice of obstetrics and gynaecology

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The anatomy of a vexatious complaint

'Vexatious' denotes a legal action or the bringer of an action that is brought without sufficient grounds for winning, purely to cause harassment or annoyance to the defendant.

The Community Affairs Reference Committee reviewed vexatious complaints to AHPRA and National Boards in the Australian medical complaints process in November 2016 and found:

- Allegations that the complaints procedure was being used as a tool for bullying and harassment.
- AHRPA functioning is likely to be jeopardised by the handling of vexatious complaints.
- Concerns that there was no avenue for AHPRA to counsel complainants on false or misleading allegations and that there were no consequences for individuals who made vexatious complaints (there are avenues for consequences, but they are never employed). They suggested that it would be beneficial if a record of vexatious complainants was kept and suggested that legal action should be taken against people found to have submitted them.
- Practitioners who receive a vexatious complaint not only have to invest time and money in defending their actions, they correspondingly experience the personal burden of shame, humiliation and psychological stress.
- Criticism of AHPRA's process in vexatious complaints included: prolonged assessment times, poor transparency and communication, no admission of conflict of interest by complainants and a reliance on unqualified investigators with insufficient expert medical input.

Let us explore these criticisms from a recent submission to AHPRA regarding one of our Fellows. We will let you be the judge of the accusation of a vexatious complaint.

The complaint

A consultant O&G (the 'defendant') committed a serious departure from standard medical practice by attempting to procure an illegal termination of pregnancy (TOP) on a 12-year-old girl ('Q'). He demonstrated a failure to understand the law as it applies to minors and pregnancy termination.

The defendant's record of events

Following a phone request from a GP in the setting of repeated pleas from Q and her mother for a TOP, the defendant:

1. Contacted his hospital administrator director of medical services (DMS) for advice.
2. Familiarised himself with the Queensland Health's published guideline on therapeutic termination of pregnancy, and managed the patient's request according to them.
3. Awaited 'facility approval' permission from the replacement DMS.
4. Meanwhile, he phoned the GP and sought a written referral letter to the hospital and asked the patient and her mother to present to the outpatients clinic.
5. Discussed the case with a second O&G consultant who concurred with and supported the medical care plan.
6. Discussed the case with the hospital social worker who knew the patient and her family well. The social worker's professional opinion supported the medical care plan in favour of TOP.
7. Discussed the case with the theatre manager to confirm theatre availability in the event that curettage was required.
8. Liaised with the Child Protection Liaison Officer who also concurred with the medical care plan.
9. Completed the mandatory reporting paperwork.
10. Spoke with the pharmacist and had misoprostol ordered in, to ensure the necessary medication was in stock at the required time. The defendant obtained the authority number from the PBS enabling him to prescribe the controlled drug.
11. Contacted the relieving DMS who was unwilling to make a decision about facility approval, and was directed to liaise with the area DMS.
12. Held a one-and-a-half-hour case conference with the patient, her mother and the social worker. The patient was assessed for Gillick competence and alternative management options were discussed and documented. Arrangements for further review were made.
13. On the third attempt to contact the DMS, the

defendant was advised that consent could only be provided by a Court since the patient was a 12-year-old girl. This advice was and is contrary to the Guideline.

14. Undertook to immediately write a detailed letter to the area DMS to fully acquaint him with the details of the case and of the advice contained within the Guideline. He asked the DMS to reconsider the need for a Court order.
15. Sought independent expert opinion regarding application of the Guideline from both the authors of the Health Department Guideline, and senior O&Gs in the area of adolescent gynaecology. They all supported the defendant's understanding of the Guideline and the medical care plan.
16. Saw the patient and her mother again to explain the delay and provide support.
17. Attended an urgent hospital multidisciplinary meeting to discuss the case where all participants agreed that Q was competent to give consent and that the matter should be dealt with urgently. The area DMS rejected this advice and announced an intention to seek a Supreme Court order. The defendant's locum contract expired on this day.
18. A week later the patient and her mother were still waiting to hear details about the Supreme Court application and expressed increasing anxiety and distress at the continued uncertainty and delays. When the defendant became aware of this he wrote to the Minister for Health seeking an urgent resolution of the matter as an advocate for Q and her family. The Supreme Court approved the TOP and it was performed without complication on the last day of the gestational period in which medical termination is regarded as safe.
19. Six weeks later the defendant received a notification from AHPRA that a complaint had been made about his management of the patient.

The informants

The complaint was made by a senior health bureaucrat, relying on the advice of the area DMS. Neither of these administrators had ever met the patient nor her family.

The substance of the written complaint was that a 12-year-old could not consent to a TOP without Court approval. The issue of contention was that the defendant (in preparing the pharmacy availability and authority approval for the medication) was viewed as intending to procure an illegal abortion by the informants. Sinister motives were attributed to the defendant. The pharmacy staff at the time were warned by the area DMS against granting the defendant access to the medication.

The submission by the area DMS was a telephone conversation recorded nine months after the events in question. AHPRA reports his opinion was that he was following the Queensland Health Guideline by insisting on a Court order for the approval of the TOP. He claimed that the defendant did not follow 'due diligence' in his management of the patient. He attributed some of the delay in the medical care management on a decision by the family to go on holiday. (The patient's absence is documented as having been discussed with her clinicians and approved because of the administrative delay, with contact numbers made available for urgent retrieval if approval was obtained for the procedure.) Furthermore, the area DMS believed that the family was not stressed throughout the process, despite having never met with them.

The AHPRA process

Timelines/transparency/communications

The defendant was under investigation for 10 months. During this time he was required to alert all possible employers to the fact that his professional practice was under investigation by AHPRA, with the result that applications for locum work were denied, something that had never happened before in eight years working as a locum. He was forced to seek work outside Australia during this time. This entailed significant additional registration and other costs, and significantly reduced income.

AHPRA states its aim is to complete each investigation in six months, but it notes that complex investigations may take longer. AHPRA allowed six months to receive communication from the single complainant with any knowledge of the case, and when a written report was unavailable, AHPRA accepted a telephone conversation in lieu with regard to the most serious allegations against the health practitioner. The defendant was mandated to submit a written report with strict timelines.

Potential conflict of interest by complainants

Given that vexatious complaints have been identified as an issue of concern, is there an expectation for AHRPA to satisfy itself that a complaint is of good faith? That is, should a declaration of potential conflict of interest be a requirement for a complaint?

In this case, the defendant requested that AHPRA consider the possibility that the complaint constituted elements of vexatiousness. There were potential conflicts of interest between the informant and the defendant, the contentious subject of abortion and the possibility of an administrator's chagrin at having a complaint about him made to the Minister.

Investigation/medical care assertions

AHPRA noted in this case, 'the practitioners involved in the care of the patient held different views regarding the patient's capacity to consent'. In fact, all clinicians involved in her direct care were in agreement; the medical administrator acting from another hospital 100km away was the only practitioner who held a different view. The role of the clinician is not appreciated.

AHPRA's aim is to ensure patient and public safety. AHPRA's comments regarding the care of this patient include, 'the information indicates the delay did not adversely affect the medical treatment that was subsequently administered to the patient' and attributes a difference in 'belief' (between the defendant and the complainant) as to the level of perceived distress to the patient and her family. The family was never consulted by the complainant, including the three weeks of uncertainty where the patient was denied treatment. It is well established that there is a greater risk of medical complications from TOP with increased gestation.

Conclusion

In the end, AHPRA determined to take no further action against the defendant 'as the issues identified for investigation were unsubstantiated'. While Queensland is awaiting a legal solution to clarify their laws regarding TOP, young women and girls will continue to request the procedure. Procedural complexities notwithstanding, prolonged complaint resolution processes and vexatious complaints remain challenges to public and patient safety.

Abandoning the principle of imposed chaperone conditions

Following the 'Independent review of the use of chaperones to protect patients in Australia' February 2017, Australia will become the first country in the world to introduce tough new measures to protect patients from healthcare practitioners accused of sexual misconduct.

The challenge of an allegation of sexual misconduct to a healthcare regulator has been to balance the interests of patient protection and those of wrongly accused practitioners to continue to work during the investigation. The traditional solution has usually been to impose 'chaperone conditions' on the practitioner as an interim patient-protection measure.

This review, commissioned by the Medical Board of Australia and AHPRA, followed the allegations of multiple indecent assaults by a Victorian neurologist who continued to molest patients with imposed chaperone conditions on his registration.

The current position

Chaperone conditions were imposed on 48 health practitioners in January 2017, including 39 doctors. Only one was female (a nurse).

Data on the 39 doctors reveal that:
- 20 were GPs
- None were O&Gs
- All were in private practice

60 per cent of the chaperone conditions were imposed as an act of immediate restriction during the investigation of alleged sexual misconduct.

The remaining 40 per cent were imposed following proven sexual misconduct. The Report notes that, 'This is contrary to the Litchfield decision of the NSW Court of Appeal (Health Care Complaints Commission v Litchfield (1997) 41 NSWLR 630 at 639F) that a doctor who cannot be trusted to see patients without the presence of a chaperone is not fit to practise medicine at all'.

Chaperone conditions were in place where a practitioner was facing similar complaints from multiple patients or had a past history of sexual misconduct.

The average length of time for an 'interim chaperone condition' was 1.8 years. The delays in investigation by a health regulator were often compounded by criminal investigation.

Key findings

Chaperones are of limited effectiveness in protecting patients. Imposed chaperones were often employees of the practitioner they were required to observe and report on. As a disturbing example, take the case of the neurologist mentioned above. He had his staff chaperoning behind a curtain while he continued to offend.

The most significant flaw in the current system was reported as a lack of informed consent. Patients often did not know why a chaperone was required.

Restriction or suspension was deemed more appropriate where the practitioner was the subject of an allegation of sexual misconduct in the following circumstances:
- More than one allegation of sexual misconduct
- Past history of allegations of sexual misconduct
- Indecent assault, sexual assault, rape or other criminal offending is alleged
- The police have laid charges
- History of non-compliance with chaperone conditions or other restrictions on practice

Recommendations

1. Use of imposed chaperones to be abandoned in favour of bans for allegations of sexual misconduct. Immediate action conditions include use of gender-based prohibitions, prohibitions on patient contact and suspensions.
2. Improved handling of investigations with highly specialised staff and prioritisation of sexual misconduct allegations.
3. Only exceptional circumstances should permit an imposed chaperone. These include where allegations are not of a criminal nature and involve only one patient. Additionally, the practitioner needs to have no relevant notification or complaint history. The mandated 'practice monitor' (the new term for imposed chaperone) needs to be a registered health practitioner with a clean record and without bias.
4. Comprehensive information given to patients, including written informed consent, at the time of appointment booking that their doctor requires a chaperone due to allegations of misconduct.

Conclusion

'Sexual advances or sexual assault by a health practitioner is a harm that society will not tolerate.' This statement underpins the Recommendations (all adopted by the Medical Board of Australia and AHPRA) that are a shift from imposed chaperones to suspensions and bans on doctors who are subject to allegations of sexual misconduct.

RANZCOG Guidelines for gynaecological examinations may need to reflect these changes, which require that 'a chaperone is available to attend any patient undergoing physical examination when requested, irrespective of the gender of the doctor.'

First testing of chaperone recommendation

A Queensland tribunal rejected AHPRA's chaperone recommendations almost immediately upon their release in April 2017 (Colagrande v Health Ombudsman [2017] QCAT 107). Queensland Civil and Administrative Tribunal decided to allow a cosmetic surgeon with a criminal conviction for sexual assault of a patient (where the practitioner was sentenced to nine month inprisonment, wholly suspended for 18 months) to continue to work with a practice monitor. The tribunal set conditions on the doctor's employment by insisting that he inform all female patients in advance of his need for a practice monitor, including on his website. The high bar set in the AHPRA recommendations for a doctor to be the practice monitor was dismissed by the Tribunal in favour of an agency nurse.

ANZJOG

From the editor's desk

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By the time these pages reach you as readers, both the first and second issues of *ANZJOG* 2017, in the new format and colour, should be with you.

The February issue kicked off with an interesting Editorial by Rosalie Grivell and Amanda Poprzeczny: 'Obstetrics: Hoping for the best, preparing for the worst. Forewarned is forearmed',[1] which complemented a paper from New Zealand by Bird et al on maternal health in pregnancy and associations with adverse pregnancy outcomes. The Bird paper is based on part of the prospective study, Growing Up In New Zealand, in which 6822 women were interviewed in the last trimester of pregnancy about their health before and during pregnancy, and their information linked to perinatal medical records including socio-demographic information.[2] The study provides vital information about quantifying the degree of morbidity chronic health conditions prior to and during pregnancy contribute to adverse pregnancy outcomes, while pregnancy itself, as the authors of the editorial describe very accurately, provides its own 'unique and short-lived' risks of morbidity and mortality.

National assisted reproductive technology (ART) standards in clinics across Australia and New Zealand are continuing to improve and risks of ART treatments to reduce, according to a recent review of clinics reported by Harrison et al.[3] Clinics in both countries are accredited and licensed against a Code of Practice consisting of 15 Critical Criteria. This system, the Joint Accreditation System for Australia and New Zealand, is administered by the Reproductive Technology Accreditation Committee (RTAC) of the Fertility Society of Australia. The incidence of clinics with variances against the Critical Criteria decreased from 77 per cent to 14 per cent from 2011 to 2013, and the mean number of variances per clinic fell from 1.54 to 0.14. All of which should be of interest to our specialist and generalist readers alike.

Other Original Articles on obstetrics deal with aspects of induction of labour, antenatal corticosteroid administration practice, and a paper dealing with the antenatal prediction of the rare but important condition of gastroschisis.[4,5,6,7]

The topic of micronised progesterone, available to Australian women since September 2016, is the subject of the short Review by Eden[8] looking at endometrial and breast safety of this product when used with oestrogens as part of menopausal hormone therapy. The author's conclusions are largely positive, although he cautions that more research is required, 'ideally a large RCT.'

In the gynaecological Original Articles, Ma et al present the results of an 11-year prospective study showing that outpatient hysteroscopy, widely practised in some overseas centres but less so in Australia to date, is 'safe, effective and acceptable to women.'[9] Successful hysteroscopic access was achieved in 94 per cent of 990 women. The authors point to the considerable savings potentially

The peer review process

ANZJOG aims to achieve a turnaround time for the first peer-review process of submissions of six weeks, that is, the time until a decision of accept, revise or reject is received by the authors. However, in practice this is not always possible. All submissions undergoing review are first referred to an associate editor (AE) (the editor-in-chief also acts as an AE). On occasion an AE may recommend rejection without review, but generally submissions are sent to two reviewers, who undertake the review process voluntarily. However, invited reviewers are not always available and it is not uncommon for six or more people to be invited before two suitable and willing reviewers agree to review. This may delay for several weeks the time until the manuscript reaches reviewers, who may then take several weeks until the review is returned. While a small number of manuscripts are either accepted or rejected at this point, most have some form of revision recommended and these recommendations are returned to the authors. Revised manuscripts then go through the same process, with the reservation that the original reviewers are not always willing to review the revision, in which case new reviewers must be found. For all these reasons turnaround time may well exceed six weeks; hopefully potential authors will be understanding of our limitations in this regard. And more reviewers are always welcome!

available if more hysteroscopy in Australia were to be provided as an outpatient, rather than inpatient, service. Elsewhere, Young et al discuss the need for further services for the provision of psychosocial care for women with endometriosis,[10] and Suisted and Chittenden demonstrate good outcomes for total laparoscopic hysterectomy in a regional hospital setting.[11]

ANZJOG's Sexual and Reproductive Health section is now well established. In this issue, Black et al present more evidence for the growing use of medical management of early miscarriage, which enables many women to avoid surgical evacuation,[12] while Perriera et al explore the implications of placenta praevia for the management of women undergoing second trimester termination of pregnancy.[13] Not unexpectedly, they found increased risks of haemorrhage, on occasion requiring transfusion. While this study comes from a centre practising only surgical second trimester procedures, these findings would have similar implications for medical termination of pregnancy.

The second in the newly established series of Current Controversies in Obstetrics and Gynaecology, which can be briefly summarised as 'the mesh debate', can be found in the February Opinion pages, where Wong and Shek argue strongly that 'Transvaginal anterior anchored mesh should not be abandoned.'[14] Mowat and Maher counter with 'Let's not repeat the mistakes of the past.'[15] Both sets of authors provide thoughtful, well-referenced, evidence-based arguments that should be of great interest to much of our readership. The authors have also written replies to their opposite numbers, which appear in the April issue of *ANZJOG*.[16,17] Further topics planned for the Controversies series include elective vaginal breech delivery, and the place of robotics in gynaecological surgery. *ANZJOG* has received a number of Letters to the Editor on the recent Controversies topics, which will start to appear from the June issue of *ANZJOG* onwards. The April issue begins with the print version of the outstanding Ian MacDonald Oration delivered by Prof John Newnham at the RANZCOG ASM in Perth in October 2016, 'The whole nine months last a lifetime.'[18] For those readers who were not at the ASM, this is the chance to catch up on some of the latest developments in maternal-fetal medicine (MFM) and particularly on preterm birth prevention; for those who were there, it is the opportunity to reflect again on the advances and challenges of this important area of perinatal medicine. A related opinion piece by Pedretti et al from Prof Newnham's department in Perth supports the universal application of cervical length screening during midtrimester ultrasound scanning for all pregnant women, not only those at high risk of preterm labour.[19]

More about the April issue, filled with interesting articles in all categories, will appear in the next issue of *O&G Magazine*. We continue, happily, to receive large numbers of submissions to *ANZJOG*, many of a very high standard and the majority of which go for peer review, so more peer reviewers are always welcome. Please contact Sarah Ortenzio at College House on anzjog@ranzcog.edu.au if you would like to join the list of reviewers.

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ANZJOGs new, full-colour format.

Research or audit in postgraduate training

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While most postgraduate specialist training programs around the world incorporate a requirement for involvement in a research project, there seems to be little evidence of the true value of the exercise. It has what might be called 'face validity', meaning that you would think it is a good idea, given that we require doctors to practice evidence-based medicine and to understand the processes whereby that evidence is gained, as well as being able to assess the validity of the research on which the evidence is based. We would not think of teaching surgery only in a classroom, but rather also hands on in the operating room. Furthermore, experience of research might lead more of our trainees to participate in research after they graduate from the course. There is not a lot of evidence to support these hypotheses.

We have been working together in Laos, a developing country with a rudimentary postgraduate training program in obstetrics and gynecology, and watching trainees trying to master even basic research programs, we are sure that there are better ways of using that time. Reflecting on the situation in Laos has led us to question whether research projects are really appropriate, even in other more developed countries.

We should want our specialists, following graduation, to be able to examine their own performance and that of their institutions in an ongoing and critical manner. We do not want them to see this type of critical evaluation of practice as a separate compartment from their day-to-day work, but rather as one component of a specialist's role. For this reason, audit rather than research seems the most appropriate activity for postgraduate trainees to undertake. An added bonus is that in Laos we lack basic data on many aspects relating to the practice of our profession, so data gathered has the potential to become a valuable tool in planning and administering services here.

It has been a difficult battle to convince those who oversee (but actually contribute little to) the postgraduate training program to change the emphasis from research to audit, but we have made major steps, leading by example. We had been developing the concept at our own hospital for several years in the face of skepticism from the university, but a breakthrough came in 2015 when

Figure 1. Morning report – minor audit of previous day's activities.

one of our trainees presented a paper on her audit of the value of ultrasound in triaging breast masses at our hospital, to the Lao Obstetric and Gynecologic Society annual meeting. She had worked very hard on her presentation and it was met initially by stunned silence as people came to see what she had done. Then, one of the very senior specialists got up, looked at her in amazement and said: 'Did you really do that work?'

Bolstered by that experience, we developed a number of other audit activities that were now, reluctantly, acceptable to the university. We had two presented at our 2016 meeting, and Dr Rupert Sherwood, past President of RANZCOG, used his guest speaker lecture to talk persuasively about audit. A Thai specialist gave a valuable talk detailing some of the large number of papers he had published based on data collected in audits, and I spoke about the concept of audit as an essential quality of specialists. So our final-year trainees are mostly doing audits, though sadly four of them have been assigned projects that seem designed to gather data to be used by a senior colleague in his PhD project.

The two audits presented last year were 'Pathways to the diagnosis of cervical cancer at Setthathirath Hospital' and 'Causes of abnormal genital tract bleeding in peri and postmenopausal women seen at Setthathirath Hospital'. We were aware most women we saw with cervical cancer had been to clinics and other hospitals before the diagnosis was made, but the audit gave us a much clearer view of just what the issues were. Patients were ignorant of the significance of signs and symptoms and many had not had vaginal examination, but instead had been reassured by a normal ultrasound that nothing was amiss. One woman had undergone several ultrasounds and a CT scan without examination and told there was nothing wrong. Even when vaginal examinations were performed, cancer was rarely recognised; Pap smears were often done from what should have been obvious cancers, and frequently the smears showed only blood and inflammatory cells with the comment 'no evidence of malignancy'. We are continuing that audit, with the intention of presenting the expanded results again this year to our meeting, but even before that happens we are seeing evidence, which the audit will hopefully confirm, of changed practices among those who have recently graduated. We are also continuing the audit on peri and postmenopausal bleeding to gather a clearer picture of the problems that have never been examined before in this country.

An audit of ectopic pregnancy is well underway. One of the very important findings so far is that roughly half the women had used a readily available abortifacient drug, 'Ya Jin', to try to procure an abortion, thinking they had intrauterine pregnancies. This is a very serious situation in a country where most of the population live in rural and remote areas where ectopic pregnancies can easily be fatal. Another finding is that virtually all the ectopics are ruptured before diagnosis and the treatment has invariably been salpingectomy rather than any form of conservative treatment.

Many of the women who undergo hysterectomy do so for abnormal bleeding that has either not responded to conservative treatment or for which the women will not accept medical treatment. Many have fibroids, and abnormal bleeding is invariably blamed on fibroids, no matter how small. So another audit is looking at the endometrial pathology in women undergoing hysterectomy for fibroids, and its correlation with symptoms. Another of our projects is examining the adequacy of information collected in the charts of women who deliver in our hospital, an exercise that we hope will improve our data collection and record keeping, which always seems very poor when complications develop.

There is a rudimentary maternal mortality review process in Laos, though it does not cover more than a small proportion of maternal deaths and does not produce useful reports to help improve practice. It seems more designed to assign blame and determine compensation. After a recent maternal death during a postpartum hysterectomy at our hospital that seemed to result from amniotic fluid embolism followed rapidly by disseminated intravascular coagulation (DIC) and death, we decided to commence an audit of 'near misses' and major complications occurring in our hospital's obstetrics and gynecology unit. We are currently analysing several cases. In one case, junior specialists performed a third cesarean section on a woman with an anterior placenta accreta through a small Pfannensiel incision and low transverse incision. The woman bled very heavily, developed DIC and nearly died. Another woman admitted for presumed ectopic had delayed surgery due to confusion about the diagnosis and the reluctance of anesthetists to allow surgery on the very sick woman; when the abdomen was eventually opened she had an invasive mole perforating the fundus causing a hemoperitoneum. She also developed DIC and required a 'pack and go back' approach. We hope that detailed analysis of these cases will improve the performance of all involved in our clinical care.

We also plan to invite officials from the Ministry of Health and the Mother and Child Institute (who are responsible for national community health projects in reproductive medicine) to spend a day with us looking at the data our audits produce, basic as it is, so that they can hopefully plan strategies to address at least some of the issues the information raises. Thus our simple audits may help improve healthcare in Laos.

While it may seem that this audit activity is not a suitable substitute for research in training programs in western countries it may be time to take a practical and realistic look at the potential benefits of these simple activities to both the daily practice of specialists and units, even in more privileged countries than ours.

Figure 2. Each year about 10 trainees graduate as specialists in obstetrics and gynecology after a three year training program.

An emergency on Australia's doorstep

Dr Charles Arcus
MBBS, BA Hons

In Australia, the caesarean section rate is currently about 30 per cent,[1] but at Port Moresby General Hospital (PMGH), in Papua New Guinea's capital, it is about 6 per cent.[2] It appears that there are two reasons for the lower section rate at PMGH. The first pertains to inadequate resources or health and state infrastructure that would not be able to sustain a rate much higher than this, and the second to the practice of careful obstetrics that aims to optimise safe, supervised and successful vaginal delivery. This is achieved with a perinatal mortality rate of less than 30 per 1000 babies that are born to the mothers who book at PMGH's antenatal clinics: this is one of the lowest perinatal mortality rates for any capital city maternity hospital in the developing world.[2]

Even if it is safe for a woman to have a caesarean section at PMGH, there is no guarantee that it is immediately possible, because of the lack of anaesthetic support or because the water supply to the theatre has been cut, making cleaning instruments and the operation of theatre impossible. Blood is often in short supply and blood products (for example, platelet concentrate) are rarely available, making any operation on a woman unsafe and unwise, especially on those who are severely anaemic[3] (about 10 per cent of those presenting for delivery, often owing to nutritional deficiencies or lack of sufficient birth spacing) or whose clotting potential is precarious already (in other words, cases of severe preeclampsia or disseminated intravascular coagulation).[2]

Doctors and midwives at PMGH work in difficult circumstances, particularly when compared to health professionals working in an urban centre in Australia. Medical necessities on the ward, such as gloves, are often out of stock or in very short supply. During the month I was there on my elective in 2016, and also for the month that followed, the labour ward staff had to make do with one (repeatedly washed and resterilised in glutaraldehyde) disposable amniohook for artificial rupture of membranes. There were also no HIV test strips to continue the essential 'Prevention of Mother to Child Transmission Program' for HIV. Sometimes, the staff have to buy essential supplies with their own money. Suture trays are often unavailable, leaving midwives or doctors having to repair tears with any equipment they can find and using any spare light they can borrow. However, amid all of this, those working somehow find a way to get the job done. Gloves are used as tourniquets, pieces of cloth as theatre caps, and nappies as means to arrest bleeding. The health personnel are resourceful and efficient. They have to be.

Many serious obstetric presentations come in the door every day. Women with little or no antenatal care may have a placental abruption or have given birth to a stillborn baby in the carpark. Women arrive in profound shock, having suffered a ruptured uterus; or present late, post-term and fully dilated with all manner of complications.[3] Tuberculosis (three out of 17 maternal deaths in 2016 could be attributed to TB) and HIV-related sepsis (2 per cent of maternal mortality in 2016) contribute significantly to the maternal mortality rate (MMR).[2] The PMGH MMR was 120.[9] per 100 000 in 2016.[2] All levels of staff face

Mary* had always intended to birth at home, as was usual and expected in her remote village. However, when Mary went into labour, things changed because she did not progress to delivery. After 24 hours of labour, it was clear she needed help. Her mother told Mary to strengthen her resolve and the two of them walked. Mary laboured and walked, with her mother, for a further 12 hours along bush tracks, for there is no road from Mary's village to Port Moresby. Eventually, the two women reached a mine where there was a helicopter that flew her to Port Moresby General Hospital. When she arrived, the baby had already died, but had not delivered. Mary was in septic shock. Doctors and midwives set about saving her life. They had to get the baby out, but the question was how. Labour was obstructed, and the presenting part was too high to be pulled out by the standard means of assisted vaginal delivery. A caesarean section could easily have killed Mary in her state of septic shock. Moreover, a caesarean section would be ill-advised, given that Mary was from a remote and inaccessible community where care in a major referral hospital could not be assured for future pregnancies that would be at increased risk of uterine rupture. The only option was to deliver the baby by destructive means. Mary was put under sedation and the obstetrician perforated the head to allow decompression and descent. A catheter was left in situ for 14 days to prevent fistula formation. Eventually, Mary recovered well. Before walking back to her remote village, she also received a contraceptive implant for several years' family planning and she (and her husband) were told about the need for them to re-present at a town for pregnancy and delivery care in the next pregnancy.

**Not her real name*

these sobering clinical realities on a daily basis. At PMGH, 45 babies are born on average every day, compared to approximately ten births a day in major Sydney maternity units. I saw many women forced to deliver on the floor because the labour ward, with only 24 beds, is so overcrowded. The use of pethidine, in the absence of any accessible epidural service, increases the need for opiate reversal in the immediate postpartum period to enable the newborn to breathe. Many babies are resuscitated in the hospital hallway by resilient medical staff, who have little option in the face of overcrowding and lack of sufficient medical services and dedicated special-purpose space.

In Papua New Guinea, over 80 per cent of the population live in remote and inaccessible areas of the country. Doctors working at PMGH need to be aware of the isolated home origin of their patients and the likely lack of obstetric help in the next pregnancy.[3] For this reason, there is a tendency to persist with attempts at vaginal delivery whenever it is reasonable to do so. Doctors will avoid caesarean births, as long as it is safe for the mother and the child, because the risk of uterine rupture is increased for women who experience subsequent pregnancies in remote communities far from medical assistance. Labours for vaginal births in PMGH are sometimes augmented for long periods in the face of slow progress, requiring staff to agonise over continuing adequate fetal condition. The instrumental delivery rate is about the same as the caesarean rate and occasionally leads to scalp trauma (subgaleal haemorrhage), requiring fluid resuscitation of the neonate. The staff are, however, undeniably committed to saving lives and make tough decisions humanely and with the best intentions for the welfare of women and their babies.

Doctors and nurses also put a lot of effort into family-planning counselling to help women leave the cycle of repeatedly closely spaced pregnancies that can put their own, and their children's lives, at risk.[4] Counselling can sometimes be quite direct, with mention made of the increased risk of future and immediate pregnancies: increased poverty for the family, lack of opportunity for education for children, unsafe abortions (often complicated by sepsis),[3] malnutrition and death.[5] Tubal ligation is strongly encouraged for those who do not want any more children and postpartum contraceptive implants are made available for those who do not want another pregnancy within the next four to five years.

As a final-year medical student from Sydney undertaking an elective period at PMGH, I became educated very quickly regarding the challenging conditions for both patients and medical staff at the hospital. My host family, socially concerned Papua New Guineans, were able to enlighten me a little about the social and political circumstances in the country, which also had serious impact on the hospital. I learned, for instance, that in some areas there is great pressure on women to have many children. Large families are thought by some (mostly rural) people to be indicators of abundance and wealth. Land ownership is highly valued and the greater the number of children a man has, the more he is able to cultivate the land he can make a claim to. A man intending to marry will cultivate and plant his land with food and cash crops. Wealth may then impress his intended wife. The man's family will pay the 'bride price' to the woman's family and seal the marriage. As her family has been paid handsomely by her husband's family, the wife can feel enormous pressure to honour the transaction by producing many children. In the past, the 'bride price' was a way of strengthening ties between clans, but nowadays it has become, in some instances, an instrument of female oppression. A woman who becomes victim of a dysfunctional and violent relationship may be unable to divorce without repaying the bride price.

Women fear violence beyond the home, too. I witnessed much systemic violence on the streets of Port Moresby during my stay. Car windscreens are smashed; a great number of security guards are located at supermarkets, outside homes and hospitals; police are often seen chasing 'rascals', who are thought to have committed street crimes; drivers returning home wait on their street, rather than in their driveway, for the gate to be opened from the inside to avoid the likelihood of car jacking; and knife fights occur in the street. This can happen even in Port Moresby, where disconnected rural people are attempting to live on land that they have no customary right to own. Whole groups of people fight because individuals mobilise their tribesmen

when they have a problem. It is too dangerous to act on your own. Authorities struggle to maintain order and basic services in a fragmented society. Australian practitioners should think about making a contribution to our nearest neighbour, Papua New Guinea, and gain, as I did, some valuable medical experience in challenging circumstances, by working alongside the courageous and committed local health professionals at PMGH, or by assisting them in disseminating family planning information and providing contraception so that women have more control over their fertility. There are many complex issues that affect delivery of healthcare on Australia's doorstep. Those I worked alongside at PMGH are heroic pragmatists and, as good neighbours, it is our responsibility to give them all the help and support we can.

Acknowledgement
I wish to acknowledge Prof Glen Mola FRANZCOG, head of O&G School of Medicine and Health Sciences, UPNG, who contributed to this article and supervised me while on placement at PMGH.

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Obituaries

Dr Peter McCormick

(1940 – 2015)

Dr Peter McCormick was born in Auckland in 1940. He was educated in Nelson and on the West Coast. He excelled at his studies and became an accomplished sportsman and rugby player. He also spent some of his childhood in Papua New Guinea.

Peter attended the University of Otago, where he graduated in 1963. That same year, he married June, and the couple moved to Christchurch. He devoted his studies to the specialty of obstetrics and gynaecology; a specialty in which he believed good practice made a major difference to people's lives.

He worked for a period of time at the Royal Women's Hospital in Melbourne as well as at the John Radcliffe in Oxford, UK. He was awarded Membership of the Royal College of Obstetricians and Gynaecologists (RCOG) in 1969.

Peter obtained Fellowship of the Royal New Zealand College of Obstetricians and Gynaecologists (RNZCOG) in 1982 and, following the amalgamation of the Australian and New Zealand Colleges, was admitted as a Fellow of RANZCOG in 1998.

Peter returned to Christchurch Women's Hospital as tutor specialist. He had a great interest in teaching and is remembered for his well-prepared lectures. He was subsequently appointed as a consultant at Christchurch Women's Hospital, where he was one of the core members of staff for many years. He was clinical director for a period in the early 1990s, a role to which he devoted significant energy. His dedication and commitment to service delivery over more than 30 years was an immense contribution to women's health services in Canterbury. He also ran a successful private practice until his retirement in 2002.

Throughout his career, Peter was passionate about obstetrics and gynaecology and was always thorough and attentive to his patients. He was a careful and accomplished surgeon, supportive of his junior staff and respectful to his nursing and midwifery colleagues. He developed an interest in carcinoma of the vulva and its precursors and made observations regarding the nature of lichen sclerosus related vulval cancers relevant to current practice.

Outside his work, Peter was a devoted family man and maintained an interest in his north Canterbury farm.

Peter died on 23 October 2015. He is survived by his wife June and children Anna, Jan, Kari and John.

Mr Michael Laney, Dr David Peddie and Dr Peter Sykes

Dr Thomas Sidey

(1934 – 2016)

Dr Thomas Sidey (Tom) was born in Dunedin, New Zealand in 1934, the only child of a former Dunedin Mayor TKS 'Stuart' Sidey and a grandson of Sir Thomas Sidey, a Member of Parliament famous for championing the cause of daylight saving in New Zealand in the 1920s.

Tom attended John McGlashan College, where he excelled in many pursuits, including playing the bagpipes, before he went to the University of Otago, graduating with MbChB in 1962. His house surgeon and registrar positions took him to New Plymouth, Timaru and Auckland and then on to England where he gained his Membership of the Royal College of Obstetricians and Gynaecologists (RCOG) in 1967. After leaving London, he undertook a three-month locum in Kitwe, one of the major towns in the copperbelt of Zambia, before travelling to Texas, where he worked for six months.

In 1970, he returned to Dunedin and commenced private practice. He became a Fellow of the RCOG in 1980, a Fellow of the Royal New Zealand College of Obstetricians and Gynaecologists (RNZCOG) in 1982 and, following the amalgamation of the Australian and New Zealand colleges, a Fellow of RANZCOG in 1998. In addition to his private practice, Tom worked as a visiting specialist at Dunedin Hospital and Clinical Senior Lecturer with the University of Otago, until his retirement in 1996.

Tom worked in general O&G practice and embraced laparoscopy very early in its development. At a time when it was common for patients to require a number of days in hospital to recuperate from a laparotomy, many of his patients were in and out of the hospital within a day.

In the eight years before he retired, his career reached its pinnacle, following the establishment of his IVF clinic in Dunedin: IVF Otago. IVF was, at the time, an emerging discipline and not yet an established practice. His vision was to bring IVF to the south of New Zealand and, in 1988, IVF Otago became the second service to open in New Zealand, with minimal funding support. Tom's dedication and perseverance ensured that IVF had a real place in New Zealand's healthcare; he can be regarded as a true pioneer in what is now an established and well-funded practice. There are now eight IVF clinics in New Zealand.

Tom had a quiet unassuming personality, a gentleman with a calm presence and had the ability to make quick decisions about patient care. He was very well liked by his patients, with many women proud to state that their specialist was Tom Sidey.

Outside of medicine, he bred and raced several outstanding thoroughbreds and was deeply involved in the racing industry administration, being a former president (and life member) of the Otago Racing Club and an executive member of the New Zealand Racing Conference.

In retirement, Tom and his second wife, Diana, moved to Arrowtown where they enjoyed their racing, golf, travel and many friends. Tom's death in September was very sudden and unexpected, and a sad loss to his extended family and many friends.

Tom is survived by Diana, his three daughters Sue, Anni and Rosie, stepchildren George, Jim and Cate, eight grandchildren and two great grandchildren, and his first wife Bridget.

Dr Wayne Gillett

Dr Charles Roy Wilson

(1931 – 2016)

Dr Charles Roy Wilson, affectionately known to family and friends as 'Chilla', was born in Brisbane in 1931, the youngest of three to join siblings, Fergus and Barbara. His father, Victor Roy Wilson, was a GP in Ashgrove with an interest in gynaecology, which may have influenced his son's choice of career.

Charles was educated at Marist Brothers Ashgrove and then boarded at Brisbane Grammar School from 1944–48. His boarding experiences left him with a lifetime aversion to baked root vegetables. He studied medicine at the University of Queensland Medical School, where he made lifelong friends with Bill Douglas, Lionel Lukin and Bill Cadzow. After graduating MBBS, Charles moved to London to study obstetrics and gynaecology at Queen Charlotte's Hospital.

After obtaining Membership of the Royal College of Obstetricians and Gynaecologists (RCOG), Charles moved to Edinburgh for surgical experience and obtained Fellowship of the Royal College of Surgeons of Edinburgh (RCSE). He also married Sue in Edinburgh.

After finishing his training, Charles and Sue moved back to Brisbane with their two children and he set up a O&G practice at 'Inchcolm' on Wickham Terrace. He was soon appointed visiting obstetrician to the Royal Women's Hospital, Brisbane. Dr John Campbell, the superintendent at the time, remembers that Charles was an excellent obstetrician. Later, he was appointed to the Princess Alexandra Hospital as a visiting gynaecologist. Not an easy job, as this was in the days before sub-specialisation when one was expected to manage everything that came through the hospital front door. With his training in gynaecology and surgery, Charles managed with aplomb.

Charles obtained Fellowship of the Royal Australian College of Obstetricians and Gynaecologists (RACOG) in 1979 and, following the amalgamation of the Australian and New Zealand Colleges, was admitted as a Fellow of RANZCOG in 1998.

Charles excelled at rugby. He was in the first 15 at Grammar; a rugby Blue at the University of Queensland, winning five premierships; and became a Wallaby. His first test cap was won as flanker in the Wallabies 1957 match against the touring All Blacks, making him Wallaby 424. He toured New Zealand the next year as captain. The young inexperienced squad exceeded expectations with Charles' direction, winning six matches, including a gritty 6–3 win over the All Blacks in the second test. In 1988, Charles became Queensland manager and a selector. He managed many of the Wallaby tours in the 1980s, including the 1982 tour to New Zealand, Italy and France in 1983 and the winning Grand Slam tour of 1984. With Charles as manager and Alan Jones the coach, this team was destined to succeed. It was during a reception at Buckingham Palace hosted by the Queen that one of the heavier forwards sat on a chair that promptly collapsed. The Queen, serene as ever, turned to Charles saying, 'Do not worry about the chair, Dr Wilson, it was very old.'

After establishing his O&G practice, Charles and Sue bought a farm at Tumbulgum, in northern New South Wales. They named it 'Benbullen' in honour of their shared Scottish heritage. Initially, Charles planted macadamias, bananas and experimented with exotic tropical fruits. The children remember days of fun and laughter with Charles, Sue and friends on the farm. The family also went on camping and fishing trips to Fraser Island, particularly during the September tailer run. It was great fun to drive up the beach to Waddy Point with Charles in his Land Rover with classical music blaring from the radio.

Charles was an extraordinary man who was impossible to dislike. He managed to combine his love of family with medicine, sport and farming, and was propelled by a powerful life force. He died on 2 September 2016, and is survived by his wife, Susan, and his four children; Robin, Annabel, Georgina and Andrew.

Dr David Salter

Dr Ma Hung Yu

(1950 – 2017)

Dr Ma Hung Yu was born in Sri Lanka in 1950. He undertook his schooling and undergraduate medical training in Columbo, where he graduated MBBS in 1976.

He then travelled to the UK where he worked in a variety of hospitals in England and Wales, gaining his Diploma and Membership of the Royal College of Obstetricians and Gynaecologists (RCOG) in 1983 and 1988 respectively.

In 1991, he travelled to New Zealand, where he worked as a senior registrar at the Waikato Women's Hospital. He became a Fellow of the Royal New Zealand College of Obstetricians and Gynaecologists (RNZCOG) in 1992 and moved to Invercargill to take up a full-time position in the department of obstetrics and gynaecology. For a short time, he did have a limited private surgical practice. His work in Invercargill involved a teaching role with the University of Otago Medical School.

Following the amalgamation of the Australian and New Zealand Colleges in 1998, Ma Hung became a Fellow of RANZCOG. In 2002, he moved to London where he joined his brother, also a doctor, and worked in general practice.

Ma Hung married Dr Rukshana Majeed, an O&G with whom he worked with in Invercargill. The couple had one young child, Mariam, to whom Ma Hung was very devoted. Tragically, Rukshana died after a short illness with a brain tumour. Ma Hung later married Zakia, a teacher from Pakistan.

Ma Hung had a keen interest in sport, especially rugby, soccer and cricket. He had represented the Columbo University in rugby and rowing. He also had a surprisingly wide general knowledge covering many subjects.

He was a quiet and diffident man who was always punctual and well presented. His overall clinical competency was very good, his surgical work and academic knowledge sound, and he was well organised. He was diligent in maintaining his ongoing education and was an efficient administrator.

Ma Hung died on 8 January 2017, and is survived by his wife Zakia and daughter Mariam.

Norman MacLean

College Statements update
March 2017

Revised College Statements

The following revised statements were approved by RANZCOG Council and Board in November 2016 and March 2017:

- Influenza vaccination during pregnancy (C-Obs 45)
  Revisions include:
  - Addition of Good Practice Points regarding free vaccination for pregnant women

- Management of obesity in pregnancy (C-Obs 49)
  Revisions include:
  - Addition of a patient summary
  - Inclusion of updated evidence regarding management based on the ability of the healthcare facility to provide experienced clinicians and adequate infrastructure

- Substance Use in Pregnancy (C-Obs 55)
  Revisions include:
  - Strengthening of recommendation that pregnant women with identified substance abuse should be screened for blood-borne viruses, Hepatitis B, Hepatitis C and HIV

- Polypropylene vaginal mesh implants for vaginal prolapse (C-Gyn 20)
  Revisions include:
  - Addition of a patient summary
  - Inclusion of evidence that transvaginal polypropylene mesh is not recommended as the first line treatment of any vaginal prolapse
  - Reclassification of transvaginal mesh as a Class III 'high-risk device'
  - Strengthening of recommendations regarding patient consent due to the very limited robust data available on the efficacy and safety of the transvaginal mesh products available in Australasia

- Long-term consequences of PCOS (C-Gyn 26)
  Revisions include:
  - Addition of a patient summary
  - Recommendation that woman with PCOS be screened for metabolic dysfunction
  - Increased focus on the assessment of the woman's mental health and wellbeing

- Management of Gestational Trophoblastic Disease (C-Gyn 31)
  Revisions include:
  - Strengthening of recommendations and inclusion of management flow chart

Retired College Statements

The following College statement has been retired:
- Obstetricians and Childbirth (C-Obs 1)

A full list of College Statements can be viewed on the Statements and Guidelines page of the RANZCOG website.

RANZCOG Patient information Pamphlets

Three new pamphlets have been approved and released on the RANZCOG website: www.ranzcog.edu.au/Womens-Health/Patient-Information-Guides/Patient-Information-Pamphlets

- Depression and anxiety during pregnancy and following birth
- Chronic pelvic pain
- Pudendal neuralgia

Prof Yee Leung
Chair
RANZCOG Women's Health Committee

A history of Crown Street

On 31 March 1983, the New South Wales Labour Government administered the coup de grace to a Sydney icon, the Women's Hospital Crown Street. To fund new hospital facilities in Sydney's west, Premier Neville Wran and Health Minister Laurie Brereton closed down inner city hospitals. The closure of Crown Street, as it was known, created great controversy and was met with resistance from the staff and public, particularly those who had had babies there.

From a modest beginning in Hay Street opposite Belmore Park on 16 October 1893, Crown Street grew to become the largest maternity hospital in NSW, delivering 6553 babies in 1972. On 9 March 1983, the last nurses' graduation ceremony was held, having trained 6705 midwives in its 90 years; the same day the last baby, the 273,569th, was delivered. Crown Street had trained most of the state's obstetricians and become world famous for its successful treatment and prevention of eclampsia.

Following its closure, there was no official history written until 2009, when the late Dr Struan Robertson, who had spent his career associated with the hospital and was its last Chairman of the Medical Staff, provided seeding finance. Dr Judith Godden, a professional historian, commenced writing and, by 2013, the book was finished and accepted for publication by Allen & Unwin. However, the unexpected death of Struan in February 2012 led to various problems that were not resolved until 2016. Publication then proceeded due to the generosity of many donors, particularly College Fellows who had trained there, with Drs Ian Brake, Peter Crowe, Peter Hammill, Chester Kent and David Woodhouse making significant contributions.

The book was launched at the State Library of New South Wales by Prof Steven Garton, the Provost of Sydney University, on Thursday 9 February, 2017 to a capacity audience and record sales were made on the night.

The book may be purchased below retail price by contacting Dr Judith Godden at judith.godden@uni.sydney.edu.au. She will sign it and post it for $40.00. If you require any further details, please contact the College.

Dr Ray Hyslop OAM
RFD, FRCOG, FRANZCOG