Perinatal and Maternal Mortality Review Committee

He matenga ohorere, he wairua uiui, wairua mutungakore

Health Quality & Safety Commission New Zealand
Kupu Taurangi Hauora o Aotearoa

Executive Summary of the 10th Annual Report of the Perinatal and Maternal Mortality Review Committee

Reporting mortality 2014

(Full report available online at www.hqsc.govt.nz/our-programmes/mrc/pmmrc/publications-and-resources/publication/2550/)

"He mateṅga ohorere, he wairua uiui, wairua mutunga-kore. The grief of a sudden, untimely death will never be forgotten."

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Foreword

The Health Quality & Safety Commission (the Commission) welcomes the 10th report of the Perinatal and Maternal Mortality Review Committee (the PMMRC).

This report considers perinatal and maternal mortality and morbidity from 1 January to 31 December 2014; perinatal mortality from 2007 to 2014; maternal mortality from 2006 to 2014; and babies with neonatal encephalopathy from 2010 to 2014. This report also includes special topics on two causes of maternal mortality: suicide and amniotic fluid embolism.

The perinatal related mortality rate, using the New Zealand definition, has been stable overall for the years 2007 to 2014. As noted in the report, the rate in 2014 was 11.2 per 1000 births, equivalent to one baby dying in pregnancy or during the first 28 days of life for every 100 babies born. Interestingly, if the World Health Organization's recommended international definition for perinatal death had been used, there would have been a significant reduction in the death rate.

There were four maternal deaths recorded in 2014, the lowest rate since the PMMRC began reporting in 2006. The three-year average mortality ratio for 2012–2014 was 14.9/100,000 maternities.

While these results are encouraging, 13 percent of perinatal deaths were identified as being potentially avoidable. The proportion of potentially avoidable deaths was higher for babies of Māori and Pacific mothers, at 22 percent. The main contributory factors among these deaths were barriers to access and/or engagement with care, which were associated with 17 and 19 percent of perinatal related deaths among babies of Māori and Pacific mothers respectively. Clearly more still needs to be done to ensure Māori and Pacific mothers receive the same level of maternity care as the rest of the population.

The review of maternal suicides from 2006 to 2013 found that many of these women had two or more risk factors for major depression, but that these factors were not always recognised, and that communication between services was not always adequate. These deaths are part of the wider problem of suicide in New Zealand – another area where more work is needed.

This report would not be possible without the substantial contribution of a dedicated team of people: the local coordinators across the country who provide these data; Dr Sue Belgrave and the PMMRC; the National Coordination Service based at the University of Auckland; the New Zealand Mortality Review Data Group based at the University of Otago; and the Mortality Review Committee staff at the Commission.

On behalf of the Commission, I sincerely thank Dr Belgrave for leading this committee's important work.

Professor Alan Merry ONZM FRSNZ
Chair, Health Quality & Safety Commission

Chair's Introduction

This is the 10th annual report of the Perinatal and Maternal Mortality Review Committee (the PMMRC) and my third as Chair.

This report adds to the wealth of data we have previously reported on, and will continue to help guide clinical practice in maternity and highlight areas that need ongoing focus for improvement. When we review and report on these data we are mindful this information has come from families and whānau who have grieved over the loss of babies and mothers. The purpose of our review is to reduce mortality and morbidity in the hope of reducing distress to future families and whānau.

The PMMRC reports to the Health Quality & Safety Commission (the Commission) and is part of the quality framework in health care in New Zealand.

In the 10th report we are reporting on perinatal deaths from 2007 to 2014, maternal deaths from 2006 to 2014 and neonatal encephalopathy from 2010 to 2014.

For the first time our report has not been published in a printed format. Our report size has increased over time and in order to maintain the level of detail and keep the report and appendices together, we have decided on an online format for this and future reports.

We have changed the categories of preterm gestational age to reflect changes in survival in very preterm babies and potential changes in practice and management of pregnancies at these early gestations. In this report we are reporting losses at 20–22 weeks, 23–24 weeks, 25–27 weeks and 28–36 weeks.

The overall perinatal mortality has not changed since we began reporting in 2007; however, there continues to be a significant reduction in perinatal related mortality using the international definition of perinatal deaths from 1000g or 28 weeks if the birthweight is unknown. The significant reduction of stillbirth at term persists, and there has been a significant reduction in deaths occurring during labour. We continue to report difficulties with access and engagement with care among Māori and Pacific mothers and the increasing risk of stillbirth and neonatal death with increasing socioeconomic deprivation.

In 2014 there were four maternal deaths, which is the lowest number of deaths in a single year in New Zealand since we began reporting in 2006. This is reassuring, but it does not reach statistical significance. In our ninth report (PMMRC 2015) we reported a significantly higher rate of deaths from suicide and amniotic fluid embolism in New Zealand when compared to the UK, and we are reporting the findings of our review of all deaths due to these causes from 2006 to 2013. Our review of deaths from amniotic fluid embolism suggests improvements in the recognition and resuscitation of mothers with amniotic fluid embolism may improve the chance of survival for some mothers. In our fifth report (PMMRC 2011) we recommended all clinicians involved in the care of pregnant women should undertake regular multidisciplinary training in the management of obstetric emergencies. Consideration should be given to making this training mandatory.

We report on progress on all previous recommendations made by the PMMRC, some of which have been incorporated into the work stream of the maternity quality and safety programmes within DHBs.

The review of severe acute maternal morbidity (SAMM) undertaken by the University of Otago has been transferred to the Commission. Following advice from an expert advisory group, a Maternal Morbidity Working Group has been established under the umbrella of the PMMRC. The Maternal Morbidity Working Group will incorporate the review of rare and serious conditions of pregnancy and post-partum by the Australasian Maternity Outcomes Surveillance System (AMOSS) working group of the PMMRC and the review of severe acute maternal morbidity.

I wish to acknowledge the women and families/whānau for their support, and also the maternity practitioners and coordinators in each DHB who provide the data to inform our report and recommendations.

Dr Sue Belgrave
Chair, Perinatal and Maternal Mortality Review Committee

Parents, Families, Whānau

First of all, on behalf of the Perinatal and Maternal Mortality Review Committee (the PMMRC) and Sands New Zealand, I am so very sorry for the loss of your precious child. If you are reading this, you have a hole in your heart that is the shape of the child(ren) you have lost, and it all seems so grossly unfair. And it is. I too have lost a child, and as such I represent all bereaved parents on the PMMRC, so our point of view is heard, considered and understood.

Having a premature baby is very difficult. It is natural to feel a mixture of emotions, some negative, some positive. Many families and whānau of premature babies feel some or all of the following: overwhelmed, shocked, traumatised, worried, powerless, full of grief, angry, guilty, hopeful, intense love for your baby, longing to be with or hold your baby, and of course a profound sense of loss.

The point of this section of the report is to provide you with the 'non-technical' feedback as to how important your baby's life is, and how real lessons have come from his or her short life. As you are probably aware, a review of your baby's case was undertaken within your own district health board (DHB) shortly after they died and your baby's case has been analysed at a national level by the PMMRC. The DHB review is to determine the cause of your baby's death and to ensure the correct care was provided to you and your child. Both reviews look for factors that may have contributed to your baby's death and areas for improvement so that, where possible, fewer families have to go through this life-changing situation. So, what can we learn from cases in 2014 (and beyond)?

Advances in neonatal medicine have worked wonders. Not long ago, extremely premature babies, or those born with very serious health problems, would inevitably have died. Today neonatologists can resuscitate babies born at ever-earlier stages of gestation. And very ill babies also benefit from advances in neonatal intensive care. Infant lives can be prolonged. Unfortunately some babies will not survive for long whatever is done for them. Others will live to leave hospital, but face severe health problems.

The question that any parent is likely to ask when a decision must be made about whether or not to resuscitate the baby is 'What will happen to my baby?' Sometimes the only honest answer the doctor can give to that question is 'I don't know.' Many reasons might be advanced to urge giving the baby the benefit of the doubt, to resuscitate the infant and see how they progress. Your natural instincts may have suggested that your parental love will and should have given the baby a chance at life, however small. This is the tricky part, both medically and emotionally. Medical guidelines sometimes suggest some babies should not be offered aggressive intensive care. But your instincts may suggest that an extremely premature newborn life be given the same value as the lives of older babies. In New Zealand of course, all babies are entitled to appropriate care, even if this subjects the baby to intrusive and painful procedures. The ideal remains the 'partnership of care' with both the families/whānau and the team of doctors. This is the case for all babies, not just the extremely premature ones, but the balance of these issues remains difficult for all involved, especially with trying to find a balance of 'head over heart'.

And here you sit, reading this, wishing your baby had survived and that you had no participation in a conversation like this at all. So, what can you do now? The first step is to recognise and accept your feelings; both now and at the time of your baby's life. Try to talk to someone about how you feel or have felt, perhaps your partner, a friend, your midwife, your family or whānau, or a Sands representative. It is never too late to talk about (or write about) your feelings and the rollercoaster that comes with an extremely premature delivery.

The second step is to understand that, even though your baby died (whether premature or not), his or her life mattered, not just to you, but to the medical team that helped directly, to the DHB in which you live, and in the bigger picture too. Every single case of loss teaches us something. No lesson is unimportant. And it is the PMMRC's purpose to learn whatever we can to make sure fewer families have to walk in the shoes you find yourselves in. We can't bring the babies back, but your babies' little lives have helped others in the future to survive.

This may have been a little life, but is not a little loss. There have been wonderfully positive things happen as a result of what your child has taught us medically. And for you, the families and whānau of these tiny champions, there are people out there who understand how you feel and are there to help, no matter when you need it, no matter what happened.

Kia kaha. You are not alone.

Linda Penlington

Executive Summary

Terms of Reference and Mortality Definitions

Terms of reference of the Perinatal and Maternal Mortality Review Committee

The Perinatal and Maternal Mortality Review Committee (PMMRC) is responsible for reviewing perinatal and maternal mortality and other mortality and morbidity as directed by the Health Quality & Safety Commission.

Mortality definitions used by the PMMRC

Fetal death is the death of a fetus at 20 weeks gestation or beyond (≥20 weeks) or weighing at least 400g if gestation is unknown. Fetal death includes stillbirth and termination of pregnancy.

Termination of pregnancy includes any interrupted pregnancy from 20 weeks whether the baby was stillborn or live born.

Neonatal death is the death of any baby showing signs of life at 20 weeks gestation or beyond or weighing at least 400g if gestation is unknown. Early neonatal death is a death that occurs up until midnight of the sixth day of life. Late neonatal death is a death that occurs between the seventh day and midnight of the 27th day of life.

Perinatal mortality is fetal and early neonatal death from 20 weeks gestation (or weighing at least 400g if gestation is unknown) until less than seven days of age.

Perinatal related mortality is fetal deaths (including terminations of pregnancy and stillbirths) and neonatal deaths (up to 28 days) per 1000 total babies born at 20 weeks or beyond, or weighing at least 400g if gestation is unknown.

A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. It does not include accidental or incidental causes of death of a pregnant woman.

Maternities are all live births and all fetal deaths at 20 weeks or beyond or weighing at least 400g if gestation is unknown. The maternal mortality ratio is calculated per 100,000 maternities.

In this 2016 report, gestational age categories have been changed in line with national and international evidence of survival of babies born at 23 weeks, which is more in line with survival at 24 weeks than at 20–22 weeks. So, throughout this report, gestational age has been categorised as 20–22 weeks, 23–24 weeks, 25–27 weeks, and then 28–31, 32–36, 37–40 and ≥41 weeks, as previously.

Findings 2016 Report (Data 2014)

Perinatal mortality

Perinatal mortality rates

1. There were 656 perinatal related deaths reported to the PMMRC in 2014. The perinatal related mortality rate was 11.2/1000 births (1 death per 89 births). There has been no significant change in overall perinatal related mortality in New Zealand from 2007 to 2014.
2. There continues to be a significant reduction in perinatal related mortality, and more specifically in stillbirth, using the international definition of perinatal deaths from 1000g or 28 weeks if birthweight is unknown.
3. The significant reduction in stillbirths and increase in terminations of pregnancy noted previously persists during the period 2007–2014. In 2014, the stillbirth rate was 5.5/1000 births and the termination of pregnancy rate was 2.5/1000 births.
4. In 2014, the neonatal mortality rate was 3.1/1000 births and has not changed significantly since 2007.
5. The previously reported significant reduction in stillbirth at term persists. This is independent of a reduction in births at 40 and 41+ weeks. There are numerous reasons why this might have occurred, such as:
    a. improved peripartum care (suggested by a reduction in hypoxic peripartum death rate)
    b. a reduction in deaths from perinatal infection
    c. a reduction in deaths from antepartum haemorrhage
    d. increased iatrogenic early birth of at-risk babies
    e. a reduction in smoking.
6. A statistically significant reduction in intrapartum stillbirth risk as a proportion of ongoing pregnancies at term since 2007 is still evident in 2014 ($p<0.0001$). This is consistent with and probably due to a significant reduction in hypoxic peripartum deaths ($p=0.0004$).

Demographic associations

7. Perinatal related mortality is more common at the extremes of maternal age. The perinatal related mortality rate among mothers under 20 and over 40 years of age was 16/1000 births in 2014 compared to 10/1000 births among mothers 30–34 years of age, who had the lowest rate. Analysis in 2014 found that age was not independently associated with stillbirth or neonatal death after adjusting for ethnicity, socioeconomic deprivation, smoking, parity and body mass index (BMI).
8. Increasing socioeconomic deprivation is associated with increasing stillbirth and neonatal death rates and inversely associated with late termination of pregnancy rates. In 2014, stillbirth rates per 1000 births varied from 4.4 for mothers living in the least deprived areas to 6.8 for mothers living in the most deprived areas. Multivariate analyses in 2014 found that socioeconomic deprivation was independently associated with only neonatal death after birth from 20 to 27 weeks.
9. The perinatal related mortality rates among women residing in Counties Manukau and Northland District Health Board (DHB) regions were significantly higher than the national rate of 10.73/1000 births from 2007–2014. The perinatal related mortality rate in Counties Manukau DHB region for 2007–2014 was 13.39/1000 births (95% confidence interval (CI) 12.53–14.27). The perinatal related mortality rate in Northland DHB region for 2007–2014 was 12.47/1000 births (95% CI 10.86–14.07).
10. The neonatal mortality rates among women residing in Waikato and Bay of Plenty DHB regions were significantly higher than the national rate of 2.83/1000 live births from 2007–2014. The neonatal mortality rate for 2007–2014 in the Bay of Plenty DHB region was 3.89/1000 births (95% CI 3.13–4.77). The neonatal mortality rate for 2007–2014 in the Waikato DHB region was 3.43/1000 live births (95% CI 2.88–3.97).

Māori disparities

11. Perinatal related mortality is more common among the children of Māori, Pacific and Indian mothers than Other Asian, Other and New Zealand European mothers. Specifically, stillbirth and neonatal mortality are more common among the children of Māori, Pacific and Indian mothers, while termination of pregnancy is less common among Māori and Pacific mothers.

12. Babies of Māori and Pacific mothers continue to have increased crude perinatal related mortality rates from stillbirth and neonatal death. However, analyses in 2014 showed that only the association with neonatal death from 20–27 weeks was significant after adjustment for the effects of socioeconomic deprivation, maternal age, smoking, parity and BMI (PMMRC 2014).

13. Māori and Pacific perinatal related deaths are less likely to be optimally investigated than deaths in all other ethnic groups. While more Māori and Pacific perinatal related deaths are partially investigated than those of other ethnicities, overall they are less likely to have any investigation (optimal or partial) than babies of other ethnicities. Talking with health professionals about their experiences of offering post-mortem investigations to families/whānau and to Māori whānau who have experienced a death and listening to their stories of being offered post-mortem might help to inform practice changes.

14. The proportion of potentially avoidable perinatal related deaths was higher among babies of Māori and Pacific mothers, at 22 percent, than all other ethnicities due to an excess of barriers to access and/or engagement with care among potentially avoidable deaths, which were associated with 17 and 19 percent of perinatal related deaths in these ethnic groups.

Stillbirth

15. In 2015, a review of the placental pathology of unexplained antepartum deaths showed that 17 percent of babies classified as unexplained antepartum death from 2007 to 2013 were misclassified: 4 percent because there was another underlying pathology and 13 percent because there was a placental abnormality which has been shown to be consistently associated with perinatal related death. There is no current category in the Perinatal Society of Australia and New Zealand perinatal death classification (PSANZ-PDC) for these latter placental causes of death.

Neonatal mortality

16. Resuscitation was attempted for 7 of 21 (33 percent) neonatal deaths at 23 weeks compared to 16 of 18 deaths (89 percent) at 24 weeks.

Screening

17. There has been a significant increase in screening for diabetes among eligible mothers whose babies died from 2007 to 2014.

18. There has been no change in the proportion of mothers screened for family violence in pregnancy among mothers of perinatal related deaths from 2007 to 2014.

Contributory factors and potentially avoidable perinatal related death

19. In 2014, one-quarter of perinatal related deaths was determined at local review to have contributory factors and approximately half (13 percent) of these to be potentially avoidable deaths.

20. The most common main contributory factors to potentially avoidable perinatal related deaths are consistently access and/or engagement with care factors, responsible for 8 to 12 percent of perinatal related deaths each year from 2011 to 2014. Personnel factors are the main contributory factor to avoidable perinatal related death in 5 to 6 percent of perinatal related deaths.

21. The largest numbers of potentially avoidable deaths in 2014 were among deaths due to maternal conditions (17), fetal growth restriction (14) and unexplained antepartum deaths (13).

22. Barriers to access and/or engagement with care contribute to most of the potentially avoidable deaths due to maternal conditions.

23. The proportion of potentially avoidable perinatal related deaths increases with increasing socioeconomic deprivation, due to increasing contribution from barriers to access and/or engagement with care.

Neonatal encephalopathy

1. In 2014 there were 55 cases of moderate and severe neonatal encephalopathy reported to the national dataset. This is the lowest number of cases reported since data were first collected in 2010 (82 cases in 2010, 67 in 2011, 79 in 2012, 70 in 2013). While this is encouraging, there is no statistically significant reduction in rate, and the observed drop in 2014 may reflect random variation.
2. The neonatal encephalopathy rate for 2010–2014 was 1.14/1000 total births (95% CI 1.03–1.27), or 1.24/1000 term births (95% CI 1.12–1.38).
3. Taranaki and Capital & Coast DHBs are represented as having statistically significantly higher neonatal encephalopathy rates than the national rate for 2010–2014. The rate at Waikato DHB, a previous outlier, is now consistent with the national rate.
4. Mothers having their first birth are over-represented among mothers of babies with neonatal encephalopathy.
5. There has been a statistically significant reduction in the proportion of babies diagnosed with neonatal encephalopathy who do not have cord gases reported from 2010 to 2014 (chi-squared test for trend p=0.02).
6. The proportion of babies with moderate or severe neonatal encephalopathy who were treated with induced cooling increased from 2010 to 2013 and has remained stable at 82 percent in 2014. The proportion of those cooled who were cooled within six hours as recommended for maximal benefit at 87 percent remains high.
7. There has been an increasing trend in the proportion of surviving babies who had a magnetic resonance imaging (MRI) investigation since collection of neonatal encephalopathy data began in 2010 to 2014, from 70 percent in 2010 to 86 percent in 2014 (chi-squared test for trend p=0.008).

Maternal mortality

1. In 2014, only four deaths within the definition of maternal mortality were reported to the PMMRC. There has been no statistically significant change in maternal mortality ratio in New Zealand since data collection by the PMMRC began in 2006.
2. The three-year average maternal mortality ratio, calculated to obtain a more robust estimate of the New Zealand ratio given small and variable numbers of deaths per year, for 2012–2014, was 14.9/100,000 maternities (95% CI 10.2–21.7/100,000).
3. Review of suicide deaths between 2006 and 2013 found:
    a. many women had two or more risk factors for major affective disorder
    b. lack of recognition of risk factors (and multiple factors) and lack of communication between services (primary and secondary and across disciplines) was evident, especially among post-termination suicides
    c. two-thirds of women had a prior psychiatric history
    d. alcohol and other substance use (often polysubstance use) and smoking were common
    e. a third of women had been previously exposed to family violence
    f. relationship stress was a feature of almost all deaths.
4. Review of 13 amniotic fluid embolism (AFE) deaths between 2006 and 2013 and five morbidities between 2010 and 2013 found:
    a. AFE deaths were not over-diagnosed in New Zealand
    b. fatal AFE cases were not more severe in New Zealand
    c. resuscitation could have been improved in some cases.

5. Maternal mortality is more common among mothers 40 years of age and older, and Māori and Pacific women, and increases with increased socioeconomic deprivation.
6. Mothers who died were significantly more likely to be obese, and to be current smokers, than all mothers birthing in New Zealand.
7. Alcohol and substance use and family violence are common among maternal deaths in New Zealand.
8. Thirty-six percent of maternal deaths were identified as potentially avoidable from 2006 to 2014, and contributory factors were identified in a further 26 percent. Contributory factors and potentially avoidable death were similarly identified in direct and indirect maternal deaths.

Recommendations

Perinatal epidemiology

That the Perinatal Society of Australia and New Zealand perinatal death classification (PSANZ-PDC) system be modified to allow the classification of babies dying with placental pathology outside of unexplained antepartum death.

Justification:
A review of 177 placental pathology reports from unexplained stillbirths from 2007 to 2013 found that 23 (13 percent) could be assigned a placental cause of death, for which there is no category in the PSANZ-PDC system. These deaths are not unexplained.

The PMMRC will apply these changes in its use of the PSANZ-PDC system beginning 2017.

Rates of perinatal related mortality and neonatal encephalopathy

That district health boards with rates of perinatal related mortality and neonatal encephalopathy significantly higher than the national rate review, or continue to review, the higher rate of mortality or morbidity in their area and identify areas for improvement.

Justification:
The perinatal related mortality rate among women residing in Counties Manukau and Northland DHB regions were significantly higher than the national rate of 10.73/1000 births from 2007–2014.

The perinatal related mortality rate in Counties Manukau DHB region for 2007–2014 was 13.39/1000 births (95% CI 12.53–14.27). The perinatal related mortality rate in Northland DHB region for 2007–2014 was 12.47/1000 births (95% CI 10.86–14.07).

The PMMRC is aware of initiatives by both of these DHBs to address the rates in their areas and acknowledges it may take some time to see an impact on mortality.

The neonatal mortality rates among women residing in Waikato and Bay of Plenty DHB regions were significantly higher than the national rate of 2.83/1000 live births from 2007–2014.

There were 91 neonatal deaths reported from 2007–2014 in the Bay of Plenty DHB region and so the neonatal mortality rate was 3.89/1000 births (95% CI 3.13–4.77). There were 151 neonatal deaths reported from 2007–2014 in the Waikato DHB region and so the neonatal mortality rate was 3.43/1000 live births (95% CI 2.88–3.97).

The neonatal encephalopathy rates for Taranaki and Capital & Coast DHBs are significantly higher than the national rate for 2010–2014. There were 17 cases of neonatal encephalopathy diagnosed among babies whose mothers were resident in the Taranaki DHB area from 2010–2014. The rate in Taranaki was 2.37/1000 term births (95% CI 1.38–3.79). There were 32 cases of neonatal encephalopathy diagnosed among babies whose mothers were resident in the Capital & Coast DHB area from 2010–2014. The rate in Capital & Coast was 1.84/term births (95%CI 1.26–2.59). The national rate from 2010–2014 was 1.24/1000 term births.

This is not a new finding for Capital & Coast DHB and the PMMRC is aware of the review of neonatal encephalopathy currently underway in the DHB.

Evidence:
Audits of perinatal deaths are required to understand causes and focus prevention efforts (Lancet Stillbirth series 2016).

Previous reports have shown that review of neonatal encephalopathy using a confidential enquiry methodology revealed suboptimal care in more than 50 percent of cases (Draper et al 2002; Kernaghan 2006).

Maternal mortality

That a Perinatal and Infant Mental Health Network be established to provide an interdisciplinary and national forum to discuss perinatal mental health issues.

Justification:
This recommendation highlights and supports a *Healthy Beginnings* 2012 recommendation (Ministry of Health 2012).

An interface between services is important for the perinatal period when multiple services may be involved – primary care, maternity, general mental health, perinatal mental health, alcohol and other drugs, social services, and termination of pregnancy services. Better processes are required for sharing information and ensuring a consistent approach to care.

Consistency in screening and consistency of maternal mental health access pathways are required.

Evidence:
This is in keeping with recommendations within the UK, including the National Institute for Health and Care Excellence (NICE) guidelines on antenatal and postnatal mental health (NICE 2014), which recommend the establishment of perinatal mental health clinical networks of perinatal clinicians and resources and other stakeholders including service users, and the Scottish Intercollegiate Guidelines Network (SIGN) guidelines on the management of perinatal mood disorders (SIGN 2012).

The 2008 Ministry of Health guideline about management of depression in primary care describes the evidence around screening for depression (NZGG 2008).

Information on the establishment of a perinatal mental health network in the UK is described in a summary entitled *Joining Up Care in Maternal Mental Health: Setting Up a Perinatal Mental Health Network* (RCOG 2016).

As recommended in the fifth report of the PMMRC (PMMRC 2011):

'All clinicians involved in the care of pregnant women should undertake regular multidisciplinary training in management of obstetric emergencies.'

Justification:
The maternal mortality ratio from AFE in New Zealand is 5.6 times higher than in the UK. The retrospective review from 2006–2013 was based on only 18 cases, and as such, it was difficult to draw definitive conclusions. However, the analysis suggests resuscitation could have been improved in some cases.

Evidence:
Systematic review of multidisciplinary training in obstetric emergencies showed it was associated with improved clinician knowledge or skills (Calvert et al 2013). It has also been shown to be associated with an improvement of 5 minute Apgar scores and hypoxic ischaemic encephalopathy (Merien et al 2010).

Overview of the 2016 Report of the PMMRC

Perinatal mortality

Perinatal mortality rates

The perinatal related mortality rate in New Zealand includes stillborn babies from 20 weeks gestation and deaths of live born babies to 27 days of life. In 2014 the perinatal related mortality rate was 11.2/1000 births. It has not changed between 2007 and 2014.

There has been a significant reduction in perinatal related mortality using the World Health Organization (WHO) international definition for perinatal related deaths from 1000g or 28 weeks if birthweight is unknown. This reduction is due to a significant reduction in stillbirths at term. This is independent of a reduction in total births at 40 and 41+ weeks. There are numerous reasons why this might have occurred such as:

- improved peripartum care – this is supported by the observed reduction in hypoxic peripartum death rate
- a reduction in deaths from perinatal infection
- a reduction in deaths from antepartum haemorrhage
- increased early birth of at-risk babies, which is observed as a reduction in births at 40 and 41+ weeks and an increase in births at 36–39 weeks
- a reduction in smoking, which is known to be associated with perinatal death.

The reduction in intrapartum stillbirth risk at term, which has been observed since 2007, remains highly significant (p=0.0001). This is consistent with and probably due to a significant reduction in hypoxic peripartum deaths (p=0.0004).

Demographic associations

Perinatal related mortality is more common at the extremes of maternal age. Analysis in 2014 found that age was not independently associated with stillbirth or neonatal death after adjusting for ethnicity, socioeconomic deprivation, smoking, parity and body mass index (BMI).

Perinatal related mortality is more common among the children of Māori, Pacific and Indian mothers than Other Asian, Other and New Zealand European mothers. After adjusting for the effects of socioeconomic deprivation, maternal age, parity, smoking and BMI, only neonatal death of babies born at 20–27 weeks was significantly more common among babies of Māori and Pacific mothers. Babies of Indian mothers remained at increased risk of stillbirth after adjusting for these factors.

Increasing socioeconomic deprivation is associated with increasing stillbirth and neonatal death rates, and with reduced late termination of pregnancy rates. Multivariate analyses in 2014 found that socioeconomic deprivation was independently associated only with neonatal death after birth from 20 to 27 weeks.

The perinatal related mortality rate among women residing in Counties Manukau and Northland DHB regions were significantly higher than the national rate.

The neonatal mortality rates among women residing in Waikato and Bay of Plenty DHB regions were significantly higher than the national rate.

Neonatal mortality

In this report, we have changed the gestational age categories for neonates. Babies born at 23 weeks are now classified with babies born at 24 weeks rather than with babies born at 20–22 weeks. This is because some babies at 23 weeks have been shown to have good quality survival, while babies at 20–22 weeks are pre-viable. Resuscitation was attempted for 7 of 21 neonatal deaths (33 percent) at 23 weeks and 16 of 18 deaths (89 percent) at 24 weeks.

Screening

There has been a significant increase, from 2007 to 2014, in screening for diabetes among mothers without pre-existing diabetes where perinatal death occurred at 28 weeks or later.

There has been no change in the proportion of mothers screened for family violence in pregnancy from 2007 to 2014.

Investigation of perinatal death

In 2015, we reviewed the placental pathology reports of 177 unexplained antepartum deaths between 2007 and 2013. Of these, 23 (13 percent) had placental pathology which likely explained the stillbirth and seven were reclassified as due to infection or bleeding. There is no current category in the PSANZ-PDC system, which we use in New Zealand to classify perinatal deaths, for isolated placental causes of death. For this reason we are recommending a change in the classification system.

Babies of Māori and Pacific mothers who die in the perinatal period are less likely to be optimally investigated (by post-mortem, karyotype or clinical examination, or investigation confirming diagnosis) than babies from other ethnic groups. Māori and Pacific mothers' babies are more likely to have no investigation following perinatal death than babies of other ethnicities. Talking with health professionals about their experiences of offering post-mortem investigations to families/whānau and to Māori whānau who have experienced a death and listening to their stories of being offered post-mortem might help to inform practice changes.

Contributory factors and potentially avoidable perinatal related death

In 2014, one-quarter of deaths were determined when reviewed to have contributory factors (organisation and/or management, personnel, or barriers to access and/or engagement with care factors associated with the death). Of the deaths where contributory factors were identified, approximately half (13 percent) were believed to be potentially avoidable.

The factors that are most often associated with potentially avoidable deaths are factors related to barriers to access and/or engagement with care, which were responsible for 8 to 12 percent of perinatal related deaths each year from 2011 to 2014. Personnel factors were the main contributory factor to potentially avoidable death in 5 to 6 percent of deaths.

The proportion of potentially avoidable deaths was higher among babies of Māori and Pacific mothers, at 22 percent, than all other ethnicities. The main contributory factors among these deaths are barriers to access and/or engagement with care, which were associated with 17 and 19 percent of perinatal related deaths in these ethnic groups.

The proportion of potentially avoidable perinatal related deaths increases with increasing socioeconomic deprivation, and this is also associated with an increase in barriers to access and/or engagement with care.

Neonatal encephalopathy

From 2016 the neonatal encephalopathy data collection will include babies diagnosed with neonatal encephalopathy from 35 weeks at birth. This is because these babies are managed in the same way as term babies with encephalopathy.

In 2014 there were 55 cases of moderate and severe neonatal encephalopathy reported to the national dataset. This is the lowest number of cases reported since data collection started in 2010. There were 82 cases reported in 2010, 67 in 2011, 79 in 2012 and 70 in 2013. This is not a statistically significant reduction in the rate of neonatal encephalopathy, but it looks like an encouraging trend. The neonatal encephalopathy rate for 2010–2014 was 1.14/1000 total births (ie, approximately one baby of every 1000 born).

Taranaki and Capital & Coast DHBs are represented as having statistically significantly higher neonatal encephalopathy rates than the national rate for 2010–2014. Waikato DHB was previously noted to have a higher rate than the national rate, but now has a rate that is consistent with the national rate.

There have been improvements in the management of babies with neonatal encephalopathy. These include:

- a significant increase in the proportion of babies diagnosed with neonatal encephalopathy who had cord blood gases taken
- an increase in the proportion of babies with moderate or severe neonatal encephalopathy who were treated with induced cooling. The proportion of those cooled who were cooled within six hours as recommended for maximal benefit at 87 percent remains high
- an increase in the proportion of surviving babies who had an MRI investigation as part of their management.

Maternal mortality

In 2014, only four deaths of mothers during pregnancy or within the first 42 days of the end of pregnancy were reported in New Zealand.

The three-year average maternal mortality ratio for 2012–2014 was 14.9/100,000 maternities (births from 20 weeks of pregnancy).

In 2015, the PMMRC reviewed the 22 maternal suicide deaths from 2006 to 2013. This review found:

- many women had two or more risk factors for major depression, and there was a lack of recognition of risk factors, and of communication between services, especially among post-termination suicides
- two-thirds of women had a prior psychiatric history
- alcohol and other substance use (often polysubstance use) and smoking were common
- a third of women had been previously exposed to family violence
- relationship stress was a feature of almost all deaths.

In 2015, the PMMRC reviewed 13 deaths and five survivors of AFE and found:

- the maternal mortality ratio from AFE in New Zealand is 5.6 times higher than in the UK, and the retrospective review concluded that death from AFE was accurately diagnosed in New Zealand
- there was no evidence that fatal cases were more severe in New Zealand, and in fact the data suggested that maybe the opposite was true
- the review suggested resuscitation could have been improved in some cases of AFE death and concluded that all clinicians involved in maternity care need to be able to recognise the possibility of AFE early in its presentation and need to be able to respond with timely and effective resuscitation.

Thirty-six percent of maternal deaths were identified as potentially avoidable from 2006 to 2014, and contributory factors were identified in a further 26 percent.

Summary of Key PMMRC 2015 Report Recommendations and Progress

Recommendation (PMMRC 9th Report)	Progress to date (June 2016)
Methodology	
1. As a matter of urgency, the Ministry of Health update the National Maternity Collection (MAT), including the ethnicity data as identified by the parents in the birth registration process.	The dataset has been made available to the PMMRC from 2014. However, we acknowledge that the dataset still does not include registration data from all DHBs that are providing primary maternity care. The Ministry of Health is working towards a solution for including registration ethnicity data in the MAT dataset, but this has not been achieved at this time.
Perinatal mortality	
1. That all maternity care providers identify women with modifiable risk factors for perinatal related death and work individually and collectively to address these. Strategies to address modifiable risk factors include: a. improving uptake of peri-conceptual folate b. pre-pregnancy care for known medical disease such as diabetes c. access to antenatal care d. accurate height and weight measurement in pregnancy with advice on ideal weight gain e. prevention and appropriate management of multiple pregnancy f. smoking cessation g. antenatal recognition and management of fetal growth restriction h. prevention of preterm birth and management of threatened preterm labour i. following evidence-based recommendations for indications for induction of labour j. advice to women and appropriate management of decreased fetal movements. All DHBs should report the availability and uptake of relevant services in their annual clinical report to ensure that these strategies are embedded and to identify areas for improvements.	DHBs are implementing strategies to address modifiable risk factors, and the Ministry of Health will also require DHBs to report on these strategies in their Annual Maternity Quality and Safety Reports. DHB strategies include early screening and encouraging women to: • engage early with a lead maternity carer (LMC) • take folic acid and iodine • eat well and be active • avoid alcohol, recreational drugs and smoking. Examples of DHB programmes include '5 Things to Do in the First 10 Weeks' and 'As Soon As Pregnant (ASAP)', which both promote the importance of: • booking with a midwife as soon as you are pregnant • avoiding smoking, alcohol and recreational drugs • taking folic acid and iodine • making a decision about screening tests • eating well and staying active. See the following websites for more information: http://www.healthpoint.co.nz/public/obstetric-and-gynaecology/capital-coast-dhb-womens-health-obstetrics/im:322319/ http://www.bopdhb.govt.nz/media/57530/bop-dhb-maternity-annual-report-2014.pdf The 'Healthy Babies, Healthy Futures' programme provides ethnically specific workshops, text messaging and support for new mothers, pregnant women and their families. See the following website for more information: http://hbhf.org.nz/ Some DHBs have established a GP liaison role within the hospital, which encourages pre-pregnancy and first trimester primary care. A pregnancy information pack has been developed to give to women at their first presentation to any health professional. This pack contains information about a wide variety of pregnancy issues including folate, smoking, diet and immunisation.

Recommendation (PMMRC 9th Report)	Progress to date (June 2016)
2. Offer education to all clinicians so they are proficient at screening women, and are aware of local services and pathways to care, for the following: a. family violence b. smoking c. alcohol and other substance use.	**Family violence.** All DHBs have measures in place for screening of family violence when women are admitted to hospital. They offer regular education sessions and training workshops to midwives and clinicians to help them identify, screen and refer women experiencing family violence. The shaken baby prevention programme has also been rolled out at a number of DHBs. The Violence Intervention Programme supports health sector family violence programmes throughout New Zealand. See http://www.health.govt.nz/our-work/preventative-health-wellness/family-violence The PMMRC will be collaborating with the Family Violence Death Review Committee to further identify strategies to improve screening for family violence in the maternity setting. **Smoking.** Smoking cessation programmes are a national health priority. The Ministry of Health, DHBs and a wide range of non-governmental organisations have made significant progress on leading New Zealand towards being smokefree by 2025. See the following websites for more information: http://www.quit.org.nz/23/reasons-to-quit/smoking-and-pregnancy http://www.heartfoundation.org.nz/programmes-resources/health-professionals/smoking-cessation-training http://innov8smokefree.co.nz/Te+Hapu+Ora+for+Midwives.html http://www.health.govt.nz/our-work/preventative-health-wellness/healthy-families-nz http://learnonline.health.nz **Alcohol and other substance use.** DHBs offer regular education sessions and training workshops to midwives and clinicians to help them identify, screen and refer women with alcohol and substance use.
3. That multi-disciplinary fetal surveillance training be mandatory for all clinicians involved in intrapartum care. a. This training includes risk assessment for mothers and babies throughout pregnancy as well as intrapartum observations. b. The aims include strengthening of supervision and support to promote professional judgement, interdisciplinary conversations and reflective practice.	Some DHBs reported that mandatory attendance at multi-disciplinary fetal surveillance training was required for all core staff. Other DHBs have responded that multi-disciplinary fetal surveillance training is occurring but is not compulsory. LMCs and obstetric staff are encouraged to attend/undertake the online programme or workshop. Other initiatives include education meetings where cardiotocograph (CTG) recordings from emergency caesareans or abnormal CTGs are reviewed as part of reflective practice, and all staff who provide intrapartum care are encouraged to undertake a 'fresh eyes' approach to CTG interpretation.

Recommendation (PMMRC 9th Report)	Progress to date (June 2016)
4. There is observational evidence that improved detection of fetal growth restriction, accompanied by timely delivery, reduces perinatal morbidity and mortality. The PMMRC recommends (amended from previous PMMRC reports) that assessment of fetal growth should incorporate a range of strategies including: a. assessment and appropriate referral for risk factors for fetal growth restriction at first antenatal visit and throughout pregnancy b. accurate measurement of maternal height and weight at first antenatal assessment c. ongoing assessment of fetal growth by measuring fundal-symphysial height in a standardised way, recorded at each antenatal appointment, preferably by the same person d. plotting of fundal height on a tool for detection of fetal growth restriction, such as a customised growth chart, from 26 weeks gestation e. if fetal growth restriction is confirmed by ultrasound, appropriate referral and assessment of fetal and maternal wellbeing and timely delivery are recommended. The New Zealand Maternal Fetal Medicine guideline (2013) describes criteria for the management of small for gestational age (SGA) pregnancies after 34 weeks. The PMMRC supports the Ministry of Health initiative to explore the evidence and validate the use of customised growth charts in New Zealand, and to investigate the appropriate way to incorporate these into the national maternity record.	The Ministry of Health supports the implementation of the UK Perinatal Institute's GROW system for assessing fetal growth in New Zealand. Work is underway to obtain a national licence so DHBs can implement the package, which includes clinician education and the customised GROW chart. The Ministry expects that each DHB will be responsible for implementing the GROW system for local clinicians, including their LMC workforce.
Maternal mortality	
5. Seasonal or pandemic influenza vaccination is recommended for all pregnant women regardless of gestation and for women planning to be pregnant during the influenza season. a. Vaccination is also recommended for maternity care providers to reduce the risk to the women and babies under their care. b. The PMMRC recommends that the Ministry of Health consult with women and maternity care providers to address barriers to the uptake of influenza vaccination in pregnancy and implement strategies to increase access to and awareness of the benefit of vaccination.	Immunisation against influenza is specifically promoted to pregnant women and available to all pregnant women free of charge. The Ministry of Health immunisation team annually provides information and resources to clinicians and the public to support this recommendation. The Health Promotion Agency immunisation programme theme for 2016 is 'Protecting Baby Begins at Pregnancy.' Further information is available at: https://www.healthed.govt.nz/resource/protecting-baby-starts-pregnancy A survey was recently conducted among pregnant women and women who had given birth in the last 12 months to understand their knowledge and attitudes towards influenza. The survey included attitudes to immunisation against influenza and whooping cough, and enablers and barriers to immunisation in pregnancy. See the following website for more information: http://www.health.govt.nz/publication/immunisation-pregnant-women-audience-research-pregnant-women A website has also been developed to help midwives, nurses and childbirth educators quickly and easily find useful information and resources about immunisation in New Zealand. See http://learnonline.health.nz/

Recommendation (PMMRC 9th Report)	Progress to date (June 2016)
Maternal mortality	
6. All pregnant women with epilepsy on medication should be referred to a physician. a. Women with a new diagnosis of epilepsy or a change in seizure frequency should be referred urgently. b. The PMMRC recommends a review of epilepsy in the *Guidelines for Consultation with Obstetric and Related Medical Services (Referral Guidelines).*	The referral guidelines are due to be revised and work is expected to begin at the end of 2016. This recommendation will be taken to the referral guidelines working group.
Neonatal encephalopathy	
7. Widespread multidisciplinary education is required on the recognition of neonatal encephalopathy. This should include: a. recognition of babies at increased risk by their history b. signs suggestive of encephalopathy c. knowledge of clinical pathways to induced cooling if required.	ACC has facilitated a cross-Ministry initiative to look at reducing the incidence of treatment injury by developing strategies to address the issues raised by the Neonatal Encephalopathy Working Group. See 'Practice Point: Recognising the Baby at Risk of Neonatal Encephalopathy' in the ninth report of the PMMRC: http://www.hqsc.govt.nz/assets/PMMRC/Publications/PMMRC_Ninth_Report_Practice_Points.pdf
8. That all DHBs review local incident cases of neonatal encephalopathy (Sarnat stages 2 and 3). The findings of these reviews should be shared at multidisciplinary local forum and form the basis of quality improvements as appropriate.	Most DHBs have advised they review local incident cases of neonatal encephalopathy, which are conducted at a multi-disciplinary level to identify areas of learning and improvement. The Ministry of Health has advised the Maternity Quality and Safety Coordinators of this recommendation.
8a. Capital & Coast DHB should review cases of neonatal encephalopathy from 2010 to 2013.	Work commenced in 2015 on retrospectively reviewing 28 cases of neonatal encephalopathy that were diagnosed between 2010 and 2013. The review consisted of a multidisciplinary team reviewing the notes with the assistance of an expert in 'human factors'. A template has been devised to consider the management and outcomes for these babies.

Practice Point: Care for Pregnant Women at Risk of Delivering at the Lower Extremes of Gestational Age

Care for pregnant women at risk of birthing at the lower extremes of gestational age (23^{+0} to 24^{+6}) remains a complex area of perinatal medicine.

Practice variation reflects the medical complexity or co-morbidity of individual cases, locality and resource availability, as well as parental wishes.

Resuscitation has been offered across all New Zealand tertiary neonatal centres to infants born at 23–24 weeks gestation. Overall mortality is higher than at more mature gestations, but high quality survival is possible.

In the context of threatened preterm labour or women requiring iatrogenic preterm birth at 23^{+0} to 24^{+6} weeks gestation, provision of an appropriate care pathway must recognise the needs of the mother as well as the baby. Mode of birth is an important part of this discussion as a caesarean section at this gestation not only has risks for the mother at the time of this birth but also has significant implications for subsequent pregnancies and may not improve neonatal outcomes.

Integrated care for women in threatened preterm labour or women requiring iatrogenic preterm birth at 23^{+0} to 24^{+6} weeks gestation should include open discussion between the family/whānau and the LMC, obstetric, and neonatal or paediatric services.

Morbidity and mortality for infants born at 23^{+0} to 24^{+6} weeks gestation reduces significantly if they deliver in a tertiary centre. Early consultation with tertiary obstetrics/neonates is recommended.

Parents and whānau should be counselled that babies at 23 weeks gestation who have not been prepared for early birth (eg, antenatal steroids, magnesium sulphate) may occasionally appear more vigorous than anticipated at birth. Admission to a neonatal intensive care unit of an unprepared baby is likely to result in severe morbidity and/or mortality.

Points for particular consideration in the context of imminent birth at 23^{+0} to 24^{+6} weeks gestation

Parents and families/whānau should be counselled antenatally about the possible range of outcomes for the baby. Where possible this discussion should be in a tertiary centre and reflect local institutional outcome data as well as current international data on long-term outcomes, particularly in relation to neurodevelopmental and cognitive outcomes. Parents and families/whānau should be included in decision-making and be aware of the range of possible interventions at this gestation.

Appropriate care options include:

1. Palliative
    a. No maternal corticosteroids or magnesium sulphate
    b. No fetal monitoring or operative birth
    c. A palliative care pathway for the baby from birth
2. Active
    a. Maternal corticosteroids and magnesium sulphate
    b. Fetal monitoring and intervention as agreed with parents and families/whānau prior to labour
    c. Resuscitation of baby at birth followed by neonatal intensive care unit care.

Practice Point: Antenatal Screening for Down Syndrome and Other Conditions

All women who are less than 20 weeks pregnant must be advised of the availability of antenatal screening for Down syndrome and other conditions.

Knowing local services and referral pathways is important as detection of fetal anomalies offers women information that may help them prepare for the birth and care of their child. This includes giving birth in a setting that has access to specialist medical or surgical care, having access to support services, the possibility of considering termination or palliative care in the newborn period.

Antenatal screening for Down syndrome and other conditions provides a risk estimate for Down syndrome (trisomy 21), Edwards syndrome (trisomy 18), Patau syndrome (trisomy 13) and some other rare genetic disorders.

Antenatal screening for Down syndrome and other conditions is optional for pregnant women. The right to decline screening, tests or further investigations should be made clear by the health practitioner.

Screening has a detection rate of 78 to 80 percent for trisomy 21, 18 and 13, which means that out of 100 pregnant women with a fetus with one of trisomy 21, 18 or 13, 78–80 will be detected by this screening.

Timing is critical for screening; women can choose first or second trimester screening.

First trimester combined screening should be completed between 9 weeks and 13 weeks 6 days gestation. The recommended timing for the blood test is 9 to 10 weeks and the nuchal translucency (NT) scan is at 12 weeks.

OR

Second trimester maternal screening should be completed between 14 and 20 weeks gestation. The recommended timing for the blood test is 14 to 18 weeks.

Women should be made aware that they need to complete both the blood test and the scan to receive a risk result for first trimester screening. The health practitioner requesting screening must fill in all sections of the screening request form (including accurate measurement of height and weight) to ensure the woman receives an accurate risk assessment.

The blood tests are free but there is often a part charge for the NT scan. Women should be advised that second trimester screening is available if they are unable to access an NT scan.

A low risk result does not mean no risk and may falsely reassure parents. A false negative result where a woman receives a low risk result and later has a baby with trisomy 21 appears to have a greater level of impact and parenting stress (Petticrew et al 2000).

Informed decision-making for this screening must include a discussion about the screened conditions and the decisions that may need to be made as a result of participation.

The National Screening Unit has produced a range of resources and guidelines, including a discussion aid as a support for health practitioners to help women make informed decisions about screening for themselves and their babies. While it can be used for all women, it has been designed to enhance discussions about screening where there are communication difficulties, including women who are deaf, have low literacy levels, have learning disabilities or are migrants/former refugees (National Screening Unit nd, National Screening Unit 2013).

View resources:
https://www.nsu.govt.nz/pregnancy-newborn-screening/antenatal-screening-down-syndrome-and-other-conditions/information
https://www.nsu.govt.nz/system/files/page/antenatal_screening_for_down_syndrome_and_other_conditions_guidelines_for_health_practitioners.pdf
https://www.nsu.govt.nz/resources/about-screening-discussion-aid-health-practitioners

Practice Point: Amniotic Fluid Embolism

Diagnosis

Consider AFE in the differential diagnosis when women present with acute behavioural changes such as sudden anxiety, agitation (eg, removing IV lines, oxygen masks, aggression) and dyspnoea in labour or immediately postpartum (within 30 minutes).

Any of the following that occur during labour, caesarean birth, dilation and evacuation or within 30 minutes postpartum without other explanation should alert the practitioner to the possibility of AFE (Thongrong et al 2013):

- acute hypotension
- cardiac arrest
- acute hypoxaemia or respiratory distress
- severe haemorrhage or coagulopathy.

Common signs and symptoms (adapted from Thongrong et al 2013)

System	**Signs and symptoms**
General – prodromal	Tingling, numbness, lightheaded, chest pain, vomiting, cough
Respiratory	Dyspnoea, bronchospasm, pulmonary oedema, acute respiratory distress
Cardiovascular	Cyanosis, hypotension, transient hypertension, chest pain, cardiopulmonary arrest
Neurological	Seizures, headache, loss of consciousness
Haematological	Coagulopathy, disseminated intravascular coagulation
Fetus	Fetal bradycardia

Management

A combination of early recognition with early and aggressive resuscitation is essential to achieve favourable outcomes for mothers and babies (RCOG 2011).

If you have any concern regarding the possible diagnosis of AFE:

- If in a primary birthing setting and there is any indication/symptom of AFE, arrange urgent transfer to secondary/tertiary care as a life-threatening condition.
- Involve senior obstetric, anaesthetic, intensive, midwifery and neonatal staff early.

If maternal collapse occurs:

- Commence/continue cardiopulmonary resuscitation (CPR) if there is evidence of cardiac arrest or circulatory insufficiency such as profound hypotension, loss of consciousness or absence of a palpable pulse.
- Instigate left uterine displacement (LUD) in women with a palpable uterus. This is ideally done manually but can be done with left tilt if there is inadequate staffing to allow manual displacement. Ensure CPR is performed on a firm surface.
- Perimortem caesarean section needs to be considered at the commencement of CPR, and if there is no return of circulation, aim for delivery within five minutes. (See 'Practice Point: Perimortem Caesarean Section' in the ninth report of the PMMRC: http://www.hqsc.govt.nz/assets/PMMRC/Publications/PMMRC_Ninth_Report_Practice_Points.pdf)
- Initiate the massive transfusion protocol, including the use of cryoprecipitate.
- Lifesaving interventions such as defibrillation and medication should not be withheld in the setting of pregnancy.

Previous PMMRC recommendation

All clinicians involved in the care of pregnant women should undertake regular multidisciplinary training in management of obstetric emergencies.

Practice Point: Maternal Suicide

Pregnancy and the postpartum period are not protective against mental illness, and can be a trigger for onset and for deterioration of mental illness.

Early during a woman's contact with services, ask about:

- past or present mental illness
- past or present treatment by a specialist mental health service, including in-patient care
- family history of severe mental illness, including perinatal mental illness in a first degree relative.

Women who have a history of severe mental illness should be referred to a secondary mental health service even if currently well, as their risk of relapse in the postpartum period may be high. They need an appropriate mental health birth plan and monitoring for the peripartum period.

Any of the following suggests a serious mental illness and requires urgent assessment by mental health services, including early consultant psychiatrist review and consultation with perinatal mental health services:

- suicidal ideation (especially if violent)
- psychotic symptoms
- recent significant change in mental state including fluctuating or emergence of new symptoms
- pervasive guilt or hopelessness
- ongoing beliefs of inadequacy as a mother
- a sense of estrangement or disconnection from the infant.

Women should have continuity of, and culturally appropriate, mental health care. During pregnancy and the postpartum period there may be more than one mental health team involved – in such cases there should be one identified individual who coordinates care.

All clinicians involved in a woman's care need relevant mental health history and current knowledge of a woman's pregnancy to support them to provide the best care. Routine sharing of relevant information across general practice, LMC and mental health services interfaces will enable better informed care. Any concerns regarding risk need to be clearly communicated by all clinicians involved.

Pregnant and postpartum women who use substances often have complex social and mental health needs, and face additional barriers in accessing services.

Previous PMMRC recommendations

1. Maternal mental health screening should be included as part of standard antenatal care, and women with a previous history of serious affective disorder or other psychoses should be referred for psychiatric assessment and management even if they are currently well.
2. Strategies are required to improve communication and coordination between the full range of primary maternity providers (eg, LMC, GP) and secondary providers (eg, mental health services, maternal mental health services, maternity, including termination of pregnancy services).

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Perinatal and Maternal Mortality Review Committee

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