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Kupu Taurangi Hauora o Aotearoa

Maternal Morbidity
Working Group



Maternal Morbidity Working Group **Annual Report**

1 September 2016 to 31 August 2017



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Acknowledgements

The Maternal Morbidity Working Group would like to thank everyone who has provided input into the programme so far. Your active engagement helped to develop the maternal morbidity review methodology and to guide our thinking for future collaborative work.

We would like to thank the women and clinicians who have provided such excellent input into the review panels, the lead maternity carers and general practitioners who provided clinical notes, and district health boards, for their support in providing notifications and clinical notes, and in releasing clinicians to participate in this work.

The MMWG commends the summarising midwives for their high-quality work. Without their input, the panel reviews would not be possible.

We look forward to continuing to work together to improve maternity care for New Zealand women, their babies and family and whānau.

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The symbolism of the harakeke in our logo and publications

We have woven harakeke (flax) in our logo and along the side of our publications. The beauty of the harakeke is reflected in its symbolism and versatility. As a plant, it represents whānau, with the child at the centre. In its woven form, it reflects the strengthening of the whole through the overlaying weave. We chose the harakeke as our logo to acknowledge that by weaving women's experiences and review processes together, we will gain a greater understanding of how the maternity system can be strengthened and improved.



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Foreword: Dr Sue Belgrave, chair of the Perinatal and Maternal Mortality Review Committee



As the chair of the Perinatal and Maternal Mortality Review Committee (the PMMRC), I am pleased to introduce the second report of the Maternal Morbidity Working Group (MMWG).

The role of the MMWG is to review cases of maternal morbidity, with a view to reducing the incidence and severity of acute severe maternal morbidity. By reviewing relevant cases, the MMWG aims to identify and address systematic factors that may contribute to the severity of the illness, and make recommendations to improve processes and practice within health services and communities.

This report highlights sepsis, the MMWG's area of focus in 2017, and summarises findings from the panel reviews and key themes that emerged. The main finding was that the severity of illness could have been reduced or prevented in half of the cases, had there been earlier identification and treatment.

Having reviewed the data and specific cases of sepsis, the MMWG makes a number of recommendations in this report. Broadly, these aim to improve the speed with which illness is recognised in pregnant or recently women, and improve responses to illness, in particular, sepsis.

The report also includes the story of Miss J, who gifted her story to the MMWG to share with others. Miss J's story presents the experience of maternal morbidity from the perspective of the woman. The MMWG values hearing the experience of the woman, and has begun a new initiative where women who have experienced severe maternal morbidity have the chance to share their stories if they wish. These stories are now being used in the review panels to provide the consumer's perspective.

On behalf of the PMMRC, I congratulate John Tait, Arawhetu Gray, members of the MMWG and the many others who have contributed to this report.

I would also like to acknowledge the hard work, dedication and ongoing commitment of the clinicians and other staff who care for and support women and their babies.

Dr Sue Belgrave

Chair, Perinatal and Maternal Mortality Review Committee

Introduction from the co-chairs

We are pleased to present the second report of the Maternal Morbidity Working Group (MMWG).



The aim of the MMWG is to improve the quality and experience of maternity care for women, babies and whānau. We do this through robust, women-centred maternal morbidity review.

With this aim in mind, we established a notification database of pregnant, or recently pregnant woman, admitted to a high dependency unit or intensive care unit. A selection of these cases are then reviewed.

This year we can provide the first report on notifications received between 1 September 2016 and 31 August 2017. We report on the findings of the regional review panels that reviewed a random selection of sepsis and peripartum hysterectomies. The findings from the 32 sepsis cases have informed the recommendations in this report.

We also introduce key projects we are undertaking to improve maternity care in New Zealand. These include the development of a national early warning system for maternity and the release of a national toolkit for maternal morbidity review, which provides all maternity services with a consistent review methodology. We encourage all maternity services to complete local reviews to recognise opportunities to learn and share lessons with others.

Thank you to all those who have been involved and supported our work over the last year. We acknowledge that our achievements are the result of collaborative efforts across lead maternity carers, general practitioners and clinicians from district health boards. We are grateful for your support and look forward to our continued work.

As co-chairs, we would also like to acknowledge members of the MMWG for the compassion, expertise and commitment they bring to improve maternal health for women in this country. Each member has significant calls upon their expertise and time, and we are privileged to have them lead, guide and direct the work of the MMWG.

For the work of any group to successfully meet its goals requires a dedicated team of individuals whose expertise and drive are exemplary. We have such a team in the Health Quality & Safety Commission: Dr Leona Dann and her colleagues Lisa Hunkin, Kat Lawrie, Dr Carlene McLean, Alice McCallum, Gail Austin, Sarah Gilbertson and Chris Hiess. We could not have achieved what we have without their incredible support and guidance.

Mr John Tait and Ms Arawhetu Gray
Co-chairs, Maternal Morbidity Working Group



Miss J's story

Being admitted to hospital not knowing what was wrong was quite a scary experience. One night I wasn't feeling 100 percent, but putting it down to the regular aches and pains from being pregnant, I went to bed. The next day I took a turn for the worse, and ended up in hospital.

I was going hot and cold. I remember lots of people coming in to see me, but I couldn't tell you what they were saying; it was all a bit of a blur. I didn't really know what was wrong, all I knew was that something wasn't right. I heard a surgeon say that my appendix was the cause of my problems, and they needed to take it out. I was really worried, as I had never had a general anaesthetic before and I didn't know what to expect. I was 34 weeks pregnant, and worried about my baby.

Waking up from the surgery I felt sore, but better. I was told everything had gone well and was relieved to hear that my baby was still inside me. However, three days after my surgery I was feeling ok but my blood results came back saying the infection was high and I needed to stay in and then I started to feel sick again. Not long after that, I was surprised to find out that I needed to have an emergency C-section to take my baby out. I wasn't mentally prepared for this. I thought my baby would stay inside me and continue to grow.

It was very strange having a C-section. As soon as the obstetrician said, 'He's here', I listened for his cry, and when I heard him, I started crying too. I felt reassured, but I also wondered what was happening, and what would happen next. I was told that my son was going to the special care baby unit (SCBU) and he was wheeled past me in an incubator. It was 12 hours before I got to see him, and even longer before I could hold him.

The whole experience was very overwhelming, and to be honest, I didn't feel like I knew what was wrong with me. It wasn't until I received a call from my post-natal midwife that I found out I had sepsis. I don't know if knowing at the time would have changed anything, but sepsis is a big deal, and I should have been told.

Recovering from two major surgeries, caring for a newborn baby in SCBU and having an 18-month-old at home was very tough. I remember being overwhelmed and torn between caring for my two children. I had to be kind to myself. I knew that if I didn't get better I would not be able to care for my son and he needed me. He spent 17 days in SCBU, which felt like forever.

I never imagined that at 34 weeks pregnant I would get sick and need to have my appendix removed. I didn't think I would hear the news that my baby would be delivered early, at 35 weeks. I don't think I realised how sick I was. If this had been my first-born child, I'm not sure if I would have had another baby.

Ten months on, my son and I are healthy and doing well. It all seems a distant memory now but it was a journey that I will never forget.

Introducing the Maternal Morbidity Working Group

The Maternal Morbidity Working Group (MMWG) was established in May 2016 under the umbrella of the Perinatal and Maternal Mortality Review Committee (PMMRC). The MMWG's role is to review and report on maternal morbidity, and to develop quality improvement initiatives to reduce maternal morbidity and improve maternal outcomes.

This is the MMWG's second annual report.¹ It outlines the work of the MMWG and provides an update on what we have achieved this year and an overview of next steps. In particular, this report presents key findings from the notifications, and from the MMWG's reviews, which focused on sepsis.

Defining maternal morbidity

Most women are healthy throughout their pregnancies; however, a small number of women experience significant maternal morbidity. Severe acute maternal morbidity (also known as maternal 'near miss') is when a pregnant or recently pregnant woman is very ill, and 'would have died had it not been luck or good care was on her side' (Mantel et al 1992). Maternal morbidity rates are used alongside maternal mortality as a measure of the quality of maternity care.

There are many ways to identify cases of severe acute maternal morbidity. The MMWG does this through notifications of admissions to high dependency units (HDUs) and intensive care units (ICUs). Research shows that nearly all maternity ICU admissions are cases of severe morbidity (ie, high specificity) and make up more than three-quarters of all severe acute maternal morbidity (ie, high sensitivity) (Geller et al 2004; You et al 2012).

The MMWG receives notifications for women who have been admitted to an HDU or ICU while pregnant, or within 42 days of the end of the pregnancy. These notifications include demographics, reason for admission and the treatment received by the women. These notifications allow the MMWG to review a portion of cases of severe maternal morbidity, develop system-level recommendations from the review findings, and develop and implement quality improvement initiatives based on the recommendations.

We acknowledge that some women receive specialised care in other areas of hospitals, such as delivery suites. We cannot robustly collect information about these cases, but this does not discount or diminish the experiences of these women or those of the people who care for them.

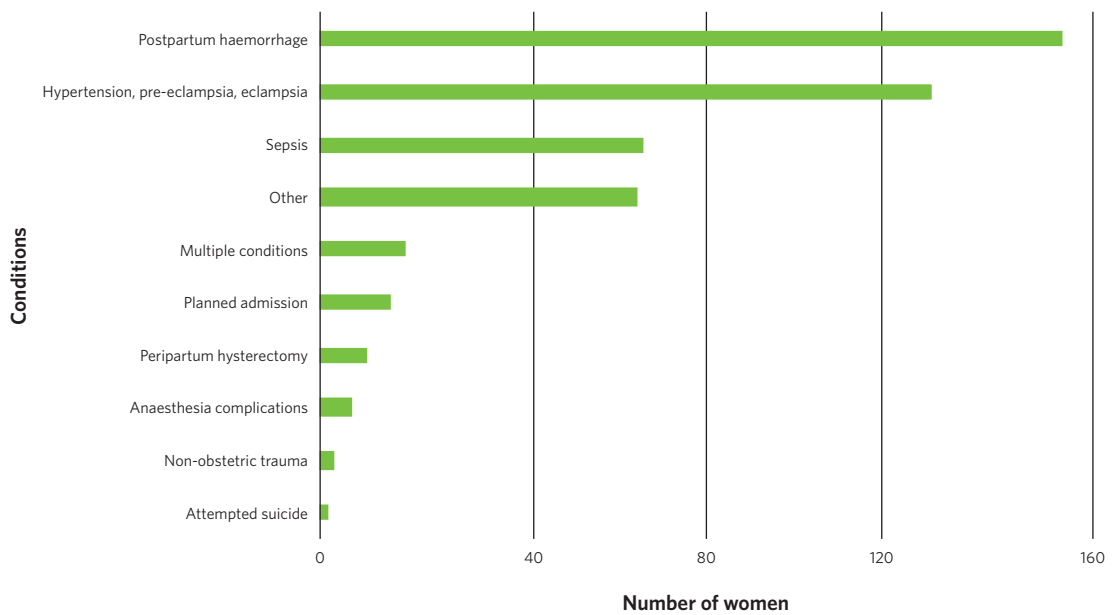
¹ The first annual report is available on the Health Quality & Safety Commission website at: www.hqsc.govt.nz/assets/PMMRC/Publications/2017_Maternal_Mortality_Chapter_11th_PMMRC_Report_.pdf.

Reviewing cases of maternal morbidity in New Zealand

Notifications of maternal morbidity

The MMWG received 514 notifications of maternal morbidity, for 469 women between 1 September 2016 and 31 August 2017. The leading reason for admission was postpartum haemorrhage, which accounted for 33 percent of all cases. This was followed by hypertension/eclampsia/pre-eclampsia cases, which accounted for 27 percent, and sepsis cases, which accounted for 14 percent (Figure 1).

Figure 1: Number of pregnant/recently pregnant women admitted to HDU/ICU, by condition, New Zealand, 1 September 2016 to 31 August 2017

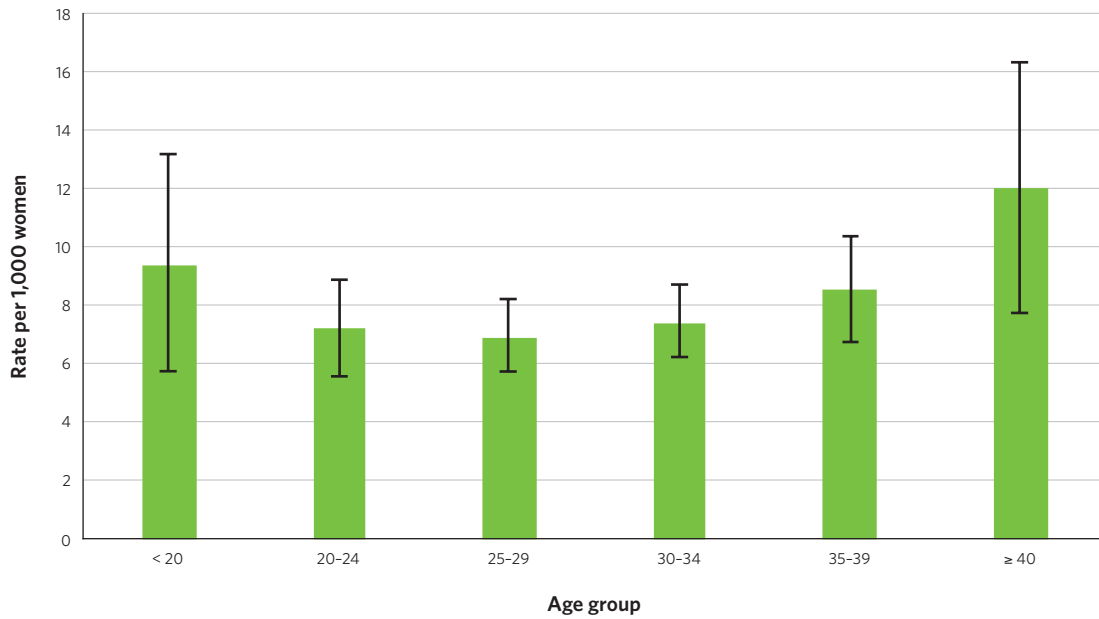


Data source: MMWG Notifications Database: Admissions to an HDU or ICU during, or within 42 days of pregnancy.

Note: 'Other' includes a wide range of other conditions or causes for admission, including but not limited to cardiac issues, anaphylaxis and chronic comorbidities.

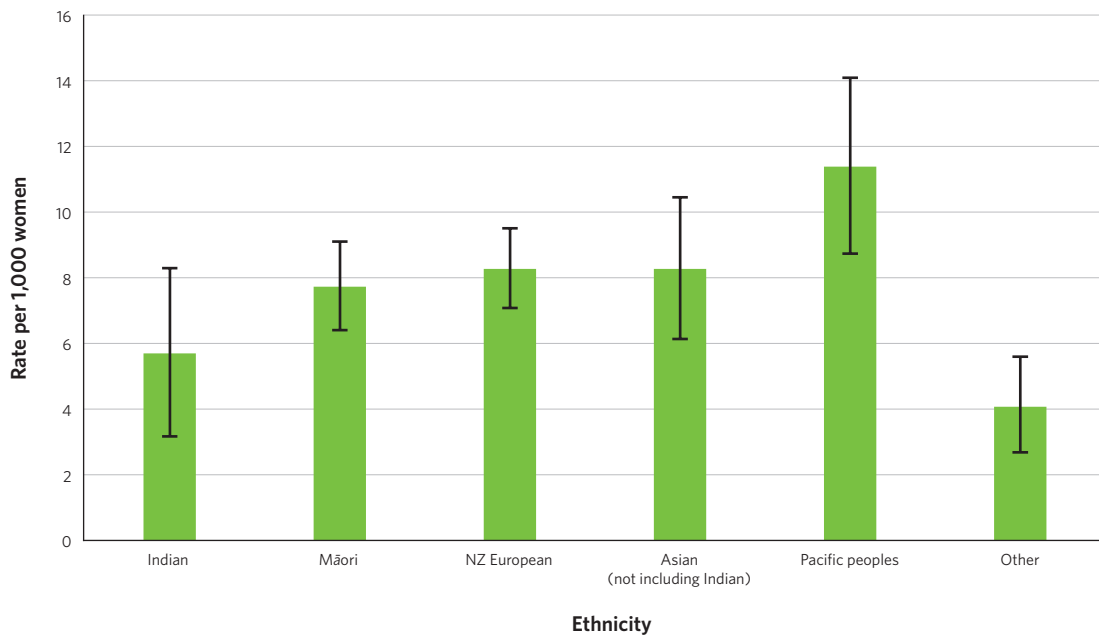
Women aged 30–34 years made up 29 percent of the cases, followed by those aged 25–29 years at 24 percent, and 35–39-year-olds at 18 percent. The highest rate was among women over 40 years, followed by women under 20 years (Figure 2).

Figure 2: Rate per 1,000 of women giving birth with an HDU or ICU notification, by age, New Zealand, 1 September 2016 to 31 August 2017



Numerator: MMWG Notifications Database: Admissions to an HDU or ICU during, or within 42 days of pregnancy.
Denominator: National Maternity Collection: Women who had babies born ≥ 20 weeks.

Figure 3: Rate per 1,000 of women giving birth with an HDU or ICU notification, by ethnicity, New Zealand, 1 September 2016 and 31 August 2017



Numerator: MMWG Notifications Database: Admissions to high dependency unit or intensive care unit during, or within 42 days of pregnancy.
Denominator: National Maternity Collection: Women who had babies born ≥ 20 weeks.

Table 1: Rate per 1,000 of women giving birth with an HDU or ICU notification, by ethnicity, New Zealand, 1 September 2016 to 31 August 2017

	Number of women admitted to HDU/ICU	Total number of women giving birth*	Rate/1,000
New Zealand European	180	21,890.5	8.22
Māori	116	14,995.0	7.74
Pacific peoples	69	6,061.0	11.38
Asian (not including Indian)	55	6,678.0	8.24
Indian	19	3,326.0	5.71
Other	30	7,221.5	4.15
Total	469	52,950.5	8.86

Numerator: MMWG Notifications Database: Admissions to an HDU or ICU during, or within 42 days of pregnancy.

Denominator: National Maternity Collection: Women who had babies born \geq 20 weeks, mean number between 2015 and 2016.

* Average number of women giving birth between 2015 and 2016, by ethnicity (MAT Dataset).

Pacific and Asian women were over-represented in the notifications of women admitted to an HDU or ICU compared with non-Pacific and non-Asian women. Pacific pregnant women were 54 percent more likely than non-Pacific pregnant women to have an HDU or ICU notification (rate ratio (RR) = 1.54, 95% CI = 1.49-1.59). Asian pregnant women were 6 percent more likely than non-Asian pregnant women to have an HDU or ICU notification (RR = 0.064, 95% CI = 1.02-1.1) (Figure 3; Table 1). The MMWG did not find a statistically significant difference between the notification rates for Māori vs non-Māori pregnant women, however this may be due to the limitations of the data, for example, incorrect ethnicity and undercounting of maternal morbidity cases (refer to Appendix 1: Methods and limitations).

Women's stories

The MMWG values the woman's voice as being integral to the review process. A woman's personal story provides the context of her pregnancy and an insight into the realities of her experience.

To ensure women's experiences are shared and heard, we established a process, in conjunction with Māori and Pacific advisors, to gather the stories of women whose cases have been reviewed. The process was approved by the Mortality Review Committee Māori Caucus. We began gathering women's stories from women who had a discharge date in March 2017. Women are sharing their stories, and these are included as part of the review process.

Panel reviews

Maternal morbidity reviews are quality improvement initiatives that allow teams to identify ways to improve systems and processes to reduce maternal morbidity. Through reviews, maternity teams learn, share and understand issues to minimise future cases of maternal morbidity.

In 2016, the MMWG established four regional review panels to review a selection of cases of specific conditions from the notifications received. The panels are multidisciplinary and comprise midwives, obstetricians, intensivists, general practitioners and consumers. Each panel aims to have at least one member with a strong understanding of Māori health.

Panels review cases using a modified version of the PMMRC's review tool, which is based on the London Protocol (Vincent and Amalberti 2016). The aim is not to assign blame to individual clinicians, but rather to consider the range of systemic and procedural factors that may have affected care.

The conditions reviewed are selected by the MMWG, and are reconsidered each year. In 2016/17, the panels reviewed cases of severe maternal sepsis and unplanned peripartum hysterectomy.

Reviews are based on clinical files provided by district health boards (DHBs), lead maternity carers (LMCs) and other primary care providers. In addition, the MMWG asks DHBs to provide contextual information, because there are many factors that influence the delivery of care, for example, acuity at the time and the availability of guidelines. Not all DHBs are able to provide this contextual information.

The MMWG encourages the panels to not only look at negative factors that impacted care, but also positive factors. Both negative and positive experiences provide opportunities for learning, innovation and improving quality. Examples of quality care highlighted in the reviews include: a strong interface between LMC and secondary care; exemplary documentation; anaesthetic teams performing well in emergency situations; and excellent communication across the multidisciplinary team.

Sepsis

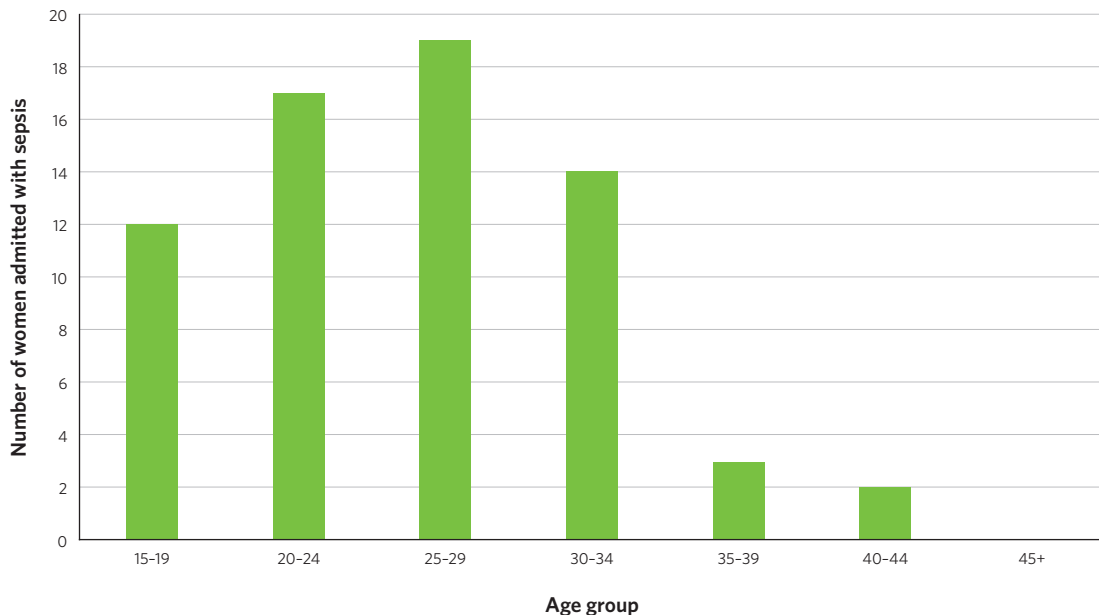
Sepsis is a 'life threatening condition that arises when the body's response to an infection injures its own tissues and organs' (Czura 2011). If sepsis is not recognised and treated promptly, it can lead to shock, multiple organ failure and death. Sepsis is one of the leading causes of severe maternal morbidity (Acosta et al 2016) and maternal death (Abir et al 2017).

Notifications

Between 1 September 2016 and 31 August 2017, the MMWG received 67 notifications of sepsis cases. The regional panels reviewed 32 of these. The reviews were completed in December 2017.

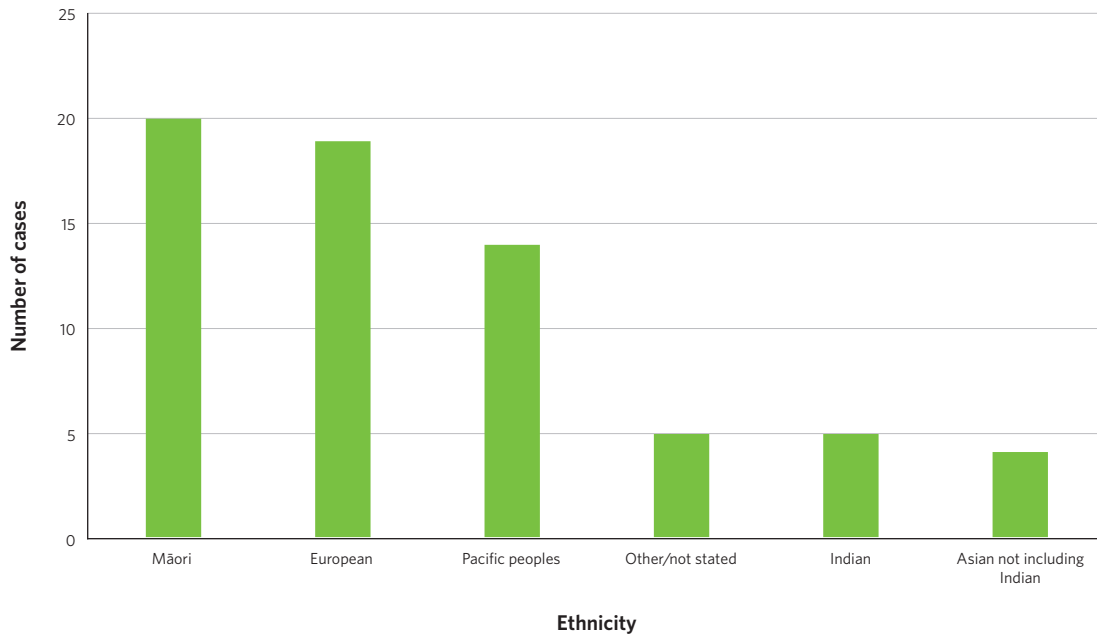
The highest number of admissions for sepsis were among 25–29 year olds (Figure 4), and among Māori women (Figure 5).

Figure 4: Number of pregnant/recently pregnant women admitted to HDU/ICU with sepsis, by age, New Zealand, 1 September 2016 to 31 August 2017



Data source: MMWG Notifications Database: Admissions to high dependency unit or intensive care unit during, or within 42 days of pregnancy, with a diagnosis of sepsis.

Figure 5: Number of cases of pregnant/recently pregnant women admitted to HDU/ICU with sepsis, by ethnicity, New Zealand, 1 September 2016 to 31 August 2017²



Data source: MMWG Notifications Database: Admissions to an HDU or ICU during, or within 42 days of pregnancy, with a diagnosis of sepsis.

Review findings from clinical notes

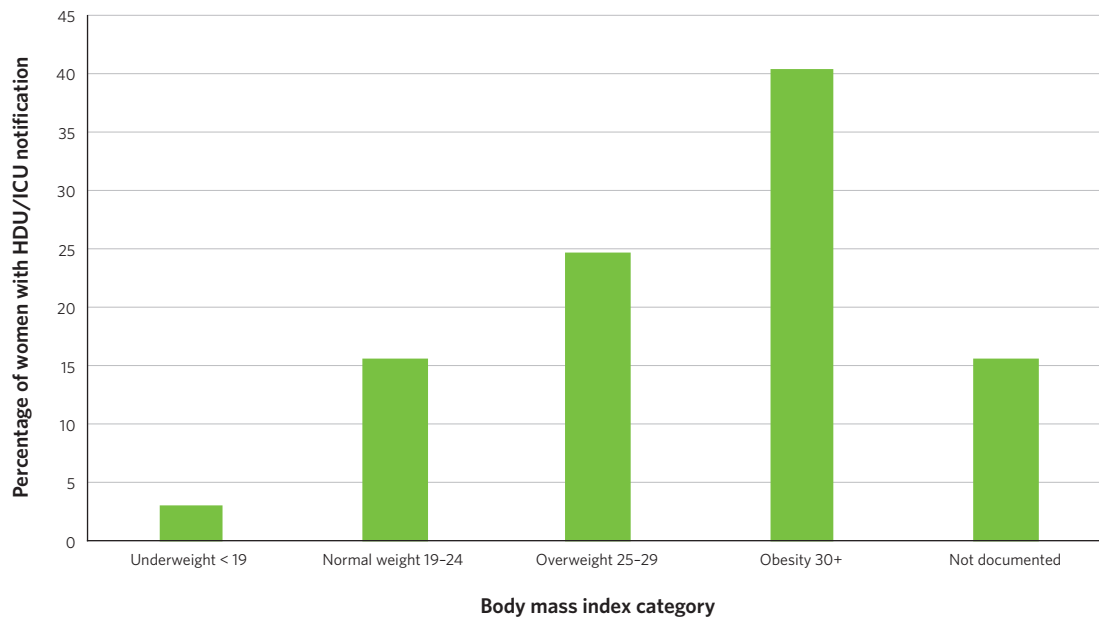
By reviewing clinical notes, panel members can better understand the wider context of a woman's case of maternal morbidity. The panels record the social determinants of health and evidence of best practice, for example, screening for family violence and smoking. Key findings from the clinical notes are listed below.

Out of the 32 reviewed sepsis cases:

- 11 of the women were screened for family violence. Fewer than three women disclosed an experience of family violence. There was no documentation of screening for the remainder of the women
- eight women had a positive smoking status, and one woman had stopped smoking during her pregnancy
- fewer than three women used marijuana and/or methamphetamine during their pregnancy
- fewer than three women had no fixed abode at the time of admission
- body mass index was recorded for 27 of the women, with a range from 17.78 to 41.00. Fewer than three women were underweight and 21 women were either overweight or obese (Figure 6)
- four women had a minimal understanding of English and the clinical files noted that this impacted communication
- 19 women were documented as taking folic acid supplements at the time of admission
- 21 women were documented as taking iodine supplements (all pregnant or recently pregnant women should be taking iodine)
- 22 women were referred to secondary care after presenting to their primary care provider and 10 women self-presented to hospital.

² The MMWG did not do any statistical analysis of the sepsis data as there were too few cases, and the numbers were not large enough. Analysing data with small numbers can be misleading, because the results can be inaccurate.

Figure 6: Percentage of women with an HDU/ICU notification, in each body mass index category, New Zealand, 1 September 2016 to 31 August 2017



Data source: Case notes supplied to the MMWG for review.

Observed themes from review panels

The panels deemed the severity of morbidity was potentially avoidable in half of the sepsis cases reviewed. They found that earlier recognition and response could have prevented the deterioration of the women to the point where they were admitted to an HDU or ICU.

The factors most frequently found to have contributed to the severity of sepsis cases were:

- failure to follow recommended best practice (59 percent)
- lack of policies, protocols or guidelines (56 percent)
- lack of recognition of severity (53 percent)
- delay in treatment (47 percent)
- inadequate communication (47 percent)
- lack of knowledge and skills of health care providers (47 percent).

A common theme across the sepsis reviews was poor knowledge regarding early identification of infection and sepsis in pregnant or recently pregnant women. No DHB was able to provide a maternity-specific sepsis guideline when asked. For those that provided a wider DHB guideline on sepsis, the guidelines were not always followed.

A lack of recognition of the severity, or a failure to notice women's deterioration, was a recurrent theme, observed in 53 percent of cases. This occurred across a range of services and specialties. Early warning score systems were often not used, or not responded to.

Many reviews noted delays in admission, being seen, diagnosis, treatment (including antibiotics) and follow up. There were instances of compromised care delivery due to inadequate staffing and inability to respond to acuity. There was also one repeated delay in access to an operating theatre due to acuity.

Communication was a factor in 47 percent of cases. Examples of poor communication included:

- insufficient information provided on admission
- poor communication between departments
- failure to communicate effectively with the woman receiving care
- a lack of interpretation services
- poor documentation, including where the rationale for decisions was not recorded.

The panels also noted missed opportunities, for example, screening by general practitioners in early pregnancy, opportunistic antenatal blood testing on presentation to the emergency department and appropriate screening. Three women also tested positive for chlamydia during their HDU or ICU admission.

Practice point: sepsis

Maternity services can improve care for women with sepsis by providing extra clinical support and resources for clinicians, including:

- access to interpreting services to support communication
- urine tests (nucleic acid amplification testing) for chlamydia, which provide faster results than swabs.

While the reviews identified many opportunities for improvement, positive themes were also noted. There were examples of strong interface between lead maternity care and secondary/tertiary care, episodes of care where the lead maternity care midwives went above and beyond their responsibilities in caring for women, and examples of teams providing exemplary care in acute situations. There were also examples where continuity of care enabled early recognition and response to deterioration, reducing the potential of a more serious outcome.

Symptoms of sepsis



Temperature
 $\geq 38^{\circ}\text{C}$ or $< 36^{\circ}\text{C}$
Shivering, fever,
or very cold



Altered mental
state or
behaviour
Confusion or
disorientation



Respiratory rate
 ≥ 25 breaths/min
Short of breath



Heart rate
 ≥ 100 beats/min
High heart rate



Systolic blood
pressure
 < 90 mmHg
Clammy or
sweaty skin



New onset
of pain
Extreme pain
or discomfort

Recommendations

1. The MMWG recommends the National Maternity Monitoring Group prioritises the development of a national guideline for the management of sepsis in pregnancy, within the next three years. The guidelines should include information for women about being unwell during pregnancy, after the birth or after miscarriage or termination.

Rationale: Sepsis is a relatively infrequent but serious condition that requires early recognition and response. It is a cause of significant maternal morbidity. The development of a nationally consistent, evidence-based guideline for the recognition and treatment of sepsis in pregnancy would support clinical judgement, expertise and knowledge. This would enable the rapid identification and treatment of sepsis.

2. The MMWG recommends DHBs include early recognition and treatment of sepsis as a component of the regular training and education sessions for multidisciplinary teams.

Rationale: Sepsis is a relatively infrequent, but serious condition that requires early recognition and response. Improved training and education would support clinical judgement, expertise and knowledge to enable the rapid identification and treatment of sepsis.

3. The MMWG recommends DHBs:

- a. establish septic bundle kits to address human factor components,³ such as stress in high-acuity settings, within the next 18 months. The kit should include all requirements of the sepsis 6⁴ + 2⁵
- b. consider establishing clinical pathways across primary and secondary/tertiary care to enable earlier recognition and treatment, while waiting for nationally consistent guidelines to be developed.

Rationale: Care bundles and clinical pathways (eg, map of medicine pathways⁶) are pre-established processes that reduce the need for individual decision-making and clinical judgement in complex environments. They help to reduce human error and speed up care and treatment in time-critical situations, eg, the diagnosis of sepsis in pregnancy.

Know the sepsis 6 + 2 to save lives

TAKE 3:

- Give high-flow oxygen
- Give a fluid challenge
- Give IV antibiotics

GIVE 3:

- Take appropriate cultures
- Measure lactate
- Measure urine output

CONSIDER 2:

- Assess fetal state and consider delivery or evacuation of retained products of conception
- Consider thrombo-prophylaxis

3 Royal College of Obstetricians and Gynaecologists. Each Baby Counts: 2015 Summary Report. London: RCOG, 2017.

4 The 'sepsis 6' is a bundle of three diagnostic and three therapeutic steps, which should be delivered within an hour of the diagnosis of sepsis. The steps are: administer oxygen, take blood cultures, administer intravenous antibiotics, measure serum lactate and send full blood count, start intravenous fluid resuscitation, and measures urine output (Daniels et al 2011).

5 There are two other crucial considerations for pregnant or recently pregnant women with sepsis: whether a woman may need to deliver the baby or have an evacuation of retained products of conception; and whether she should receive thromboprophylaxis (Bowyer et al 2017).

6 <http://mapofmedicine.com/>



Postpartum haemorrhage and peripartum hysterectomy

Primary postpartum haemorrhage is the loss of a significant amount of blood within 24 hours of childbirth. It is one of the leading causes of maternal morbidity (Farber et al 2016), and is the leading cause of maternal admission to HDUs and ICUs in New Zealand.

The most severe cases of postpartum haemorrhage can result in an emergency peripartum hysterectomy. This is major surgery, where a woman's uterus is removed. Peripartum hysterectomies are only used as a last resort procedure to save a woman's life, as the procedure prevents the woman from being able to carry any future pregnancy.

Notifications

Between 1 September 2016 and 31 August 2017, the MMWG received 154 notifications for cases of postpartum haemorrhage (33 percent of cases), and 10 notifications for cases of peripartum hysterectomy (2 percent).⁷ This number is likely to be an underestimate because not all peripartum hysterectomies end up in HDUs or ICUs. Many women receive specialised care elsewhere, often in a delivery suite.

Reviewing cases of peripartum hysterectomy

Postpartum haemorrhage has been the focus of other reviews and audits, including the severe acute maternal morbidity audit (Lawton et al 2014). Since the resulting information and recommendations have been consistent, the MMWG decided not to review cases of postpartum haemorrhage. Instead we focused on peripartum hysterectomy, which has not been the central focus of other reviews.

Due to the relatively small number of notifications for peripartum hysterectomies in 2016/17, we will continue to review all cases in 2018. This will allow the panels to review a sufficient number of cases to identify key themes and develop insights relevant to New Zealand. The findings will inform new quality improvement opportunities and initiatives.

Quality improvement activities

Maternal morbidity review toolkit for maternity services

In response to feedback from the sector, the MMWG and the Commission developed a toolkit to support DHBs to implement local maternal morbidity reviews. It was tested in six DHBs and will be released later in 2018.

The toolkit provides maternity services with a clear, easy-to-use, evidence-based framework for reviewing significant cases of maternal morbidity. It sets out recommended principles, a suggested process for establishing a local review, draft terms of reference for local review panels, and other resources and tools to support local reviews.

The toolkit is based on the premise that reviews take place in a safe and fair environment where women, their families and whānau, and the clinicians who directly cared for the women, are involved in the process.

Maternal early warning system

Based on the notifications received to date, the MMWG estimates approximately 470 women experience severe maternal morbidity each year. Two studies (Sadler et al 2013; Lawton et al 2014) and the findings of the regional review panels suggest that at least half of these cases are preventable, and that earlier recognition and treatment could have improved the care the women received.

⁷ Peripartum hysterectomies that do not end up in HDU/ICU are not reported to the MMWG, therefore this number is an underestimate of the total number of peripartum hysterectomies.

To improve recognition and response to deteriorating pregnant women, the MMWG is collaborating with the Commission and the sector to lead the development of a national maternity early warning system (MEWS). This will involve a national vital signs chart and resources for maternity services to develop essential components of the system. These include a localised escalation pathway, effective clinical governance and leadership, education, and ongoing measurement for improvement.

The aim of the MEWS will be reduced harm through a consistent national process, reduced maternity admissions to HDU and ICU, and reduced length of stay for maternity patients in HDU, ICU and maternity services.

We are working with key stakeholders to decide on the most suitable early warning track and trigger tool, and appropriate thresholds and triggers for the New Zealand context. Various pilot sites are testing the system for usability. The maternity sector has given us significant input into making the MEWS fit for purpose.

[An audit tool for postpartum haemorrhage national guidelines](#)

The Ministry of Health developed a national postpartum haemorrhage guideline in 2013, which is currently under review.

DHB midwifery leaders asked the MMWG to develop an audit tool to help DHBs review postpartum haemorrhage. This tool would sit alongside the national guideline. We considered and investigated the feasibility of the request.

During initial scoping, we found that maternity services' use of the guidelines was highly variable. A standardised audit tool would not be sufficient to align local processes to the national guidelines.

Due to the size and nature of the task associated developing an audit tool aligned to the national guidelines, and our commitment to other quality improvement initiatives, we are unable to commit to this. Instead, we have suggested to the Ministry of Health that an audit tool is included in the reviewed national postpartum haemorrhage guideline. This would respond to the sector's request and support local postpartum haemorrhage reviews.

Next steps for the MMWG

The MMWG believes the number of sepsis cases reviewed between 1 September 2016 and 31 August 2017 was sufficient to determine key themes, analyse factors that contribute to maternal morbidity, and inform recommendations. The MMWG will no longer review cases of sepsis.

We have considered various options for review panels to focus on in 2018, including specific age groups, specific ethnicities or those receiving a specific treatment (eg, vasopressors or ventilation). We have decided to focus on cases of hypertension, pre-eclampsia and eclampsia, because these are one of the leading causes of maternal morbidity. A proportion of these notifications will be reviewed in 2018.

Peripartum hysterectomy cases will also continue to be reviewed throughout 2018.



Appendix 1: Methods and limitations

Numerator data

The Commission provides all HDUs and ICUs with a maternal morbidity notification form, which has the following instructions: *'Please fill in the details below for each woman who was admitted to HDU and ICU and was pregnant or had delivered within 42 days prior to admission'*.

After a pregnant or recently pregnant woman is admitted to an HDU or ICU, organisations are responsible for returning the completed notification form to the Commission.

While reporting cases of maternal morbidity is recommended and requested, it is not required. This leads to variation in reporting practice across hospitals. Analysis and comparisons of specific numbers in this report may be of limited value due to these variations. However, this report provides valuable insights into cases of maternal morbidity.

All notifications data presented in this report came from the MMWG's notification database, which is managed by the Commission.

Data reported for the reviewed sepsis cases came from the panel review database, also managed by the Commission.

Denominator data

Denominator data came from the National Maternity Collection (MAT), 2015/16. The MAT combines data collected by LMCs, which is required to enable claims for payment, with hospital discharge data. For this report, the MMWG used the mean between 2015 and 2016 to source the comparator data.

Limitations

Quality of the data

Notifications of HDU/ICU admissions is not a perfect proxy for the incidence of maternal morbidity. While notifications do have high specificity and sensitivity (Geller et al 2004; You et al 2012) to capture cases of maternal morbidity, it is not a perfect measure. There is also variation in reporting practice across different hospitals. These factors mean cases of maternal morbidity are likely to be undercounted.

Ethnicity

The numerators and denominators were sourced from different data sets, which can result in numerator-denominator bias. Caution is advised when interpreting these results.

Ethnicities in the MMWG's Notifications Database are derived from the ethnicity recorded on a patient's clinical file.

Ethnicities in the MAT denominator set are derived from ethnic codes reported to National Minimum Dataset birth and postnatal events, LMC labour and birth claims and National Health Index at time of delivery. Ethnicity has been reported as prioritised ethnicity.

The possible undercounting of cases of maternal morbidity can lead to an underestimation of the incidence of maternal morbidity. This can have an impact on the counts and observed rates of minority ethnicities.

Appendix 2: Resources

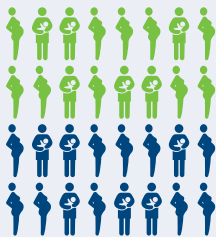
Preventing maternal morbidity: Is it sepsis? Know the signs, know what to do

Between 1 September 2016 and 31 August 2017, **469 women** were admitted to a high dependency unit or an intensive care unit, when they were **pregnant or recently pregnant**.

14% of these women had sepsis.

Sepsis is a 'life threatening condition that arises when the body's response to infection injures its own tissues and organs'. If sepsis is not recognised and treated promptly, it can lead to shock, multiple organ failure and death.

A review of 32 of the 67 sepsis cases found that with **earlier recognition and response**, the severity of the cases could have been...





... avoided
in 50%
of the cases


! Always be alert for symptoms of sepsis. Remember sepsis can be challenging to identify early on as the symptoms may be subtle and can mimic other symptoms of pregnancy.


Ensure women you provide care for understand early signs of infection at any time around pregnancy, and advise them to **seek help earlier than they would normally.**


Sepsis Know the signs:


- 

Temperature
≥ 38° C or < 36° C
Shivering, fever, or very cold
- 

Altered mental state or behaviour
Confusion or disorientation
- 

Respiratory rate
≥ 25 breaths/min
Short of breath
- 

Heart rate
≥ 100 beats/min
High heart rate
- 

Systolic blood pressure
< 90 mmHg
Clammy or sweaty skin
- 

New onset of pain
Extreme pain or discomfort

Refer to on-call obstetric team without delay

Know what to do. Know your sepsis 6 + 2:

By doing these six simple things in the first hour, you can double the woman's chance of survival.

GIVE 3:

- Give high-flow oxygen
- Give a fluid challenge
- Give IV antibiotics


TAKE 3:

- Take appropriate cultures
- Measure lactate
- Measure urine output


CONSIDER 2:

- Assess fetal state and consider delivery or evacuation of retained products of conception
- Consider thromboprophylaxis


Preventing maternal morbidity: Is it sepsis? Know the signs, know what to do




Know the **signs of infection** and sepsis.




Familiarise yourself with the **maternity vital signs chart** in your DHB and local escalation pathway.




Ask about your local maternity service septic care bundle, which includes the **sepsis 6 + 2**, a tool to help you know what you need to do.



Work with your maternity service to have a **responsive escalation pathway.**




If the woman has **English as her second language, or a disability**, ensure you access suitable communication support, such as a professional interpreting service.



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Maternal Morbidity
Working Group

Sepsis in pregnancy: Know the signs, know what to do

Sepsis is a 'life threatening condition that arises when the body's response to infection injures its own tissues and organs'. If sepsis is not recognised and treated promptly, it can lead to shock, multiple organ failure and death.

THE SYMPTOMS:



Temperature
≥ 38°C or < 36°C
Shivering, fever, or very cold



Altered mental state or behaviour
Confusion or disorientation



Respiratory rate
≥ 25 breaths/min
Short of breath



Heart rate
≥ 100 beats/min
High heart rate



Systolic blood pressure
< 90 mmHg
Clammy or sweaty skin



New onset of pain
Extreme pain or discomfort

Always be alert for symptoms of sepsis. Remember sepsis can be challenging to identify early on as the symptoms may be subtle and can mimic other symptoms of pregnancy.

Recognising the signs and responding promptly is critical.

Research shows that by doing these things within the first hour can double a woman's chance of survival.

Know the sepsis 6 + 2 to save lives

GIVE 3:

- Give high-flow oxygen
- Give a fluid challenge
- Give IV antibiotics

TAKE 3:

- Take appropriate cultures
- Measure lactate
- Measure urine output

CONSIDER 2:

- Assess fetal state and consider delivery or evacuation of retained products of conception
- Consider thromboprophylaxis

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