Queensland Mothers and Babies 2018–2019

Report of the Queensland Maternal and Perinatal Quality Council 2021

Queensland Government

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Disclaimer

Foreword

The Queensland Maternal and Perinatal Quality Council (QMPQC) is the peak body auspiced by Queensland Health to monitor the maternal and perinatal outcomes of maternity and perinatal care delivered across the State. The work of the QMPQC is greatly informed by its three sub-committees, the Maternal Mortality Sub-Committee, the Perinatal Mortality Sub-Committee and the Congenital Anomalies Sub-Committee.

Leonie Callaway

Co-Chair,
Queensland Maternal and Perinatal Quality Council

Ted Weaver

Co-Chair,
Queensland Maternal and Perinatal Quality Council

The principal purpose of the QMPQC is to conduct comprehensive reviews of patient records and other collated data. Benchmarking against comparable services and making recommendations, with the aim of improving the safety and quality of the care of the women and their families, who we look after, is out aim. From this, the QMPQC is also responsible for contributing to national data reporting.

This report focuses primarily on the 119,203 mothers who gave birth to 120,946 babies in Queensland in 2018 and 2019, a biennium that overlapped slightly with the start of the COVID-19 pandemic. The last two years from the start of 2020 have seen unprecented challenges within the healthcare system and the way that maternity care has been delivered. It is important to bear in mind when reading this report, that these challenges are not included due to incomplete data for this reporting period. Future QMPQC reports will address these challenges and the consequent outcomes.

It is worth noting that the fertility rate for Queensland mothers continues to decline. In this biennium the average woman in Queensland had 1.7 babies in her lifetime. This is well below 'replacement' to maintain a stable population and has implications for policy development within the various areas of Government.

Safe provision of maternity care in Queensland poses unique difficulties, because it is the most decentralised state in Australia and significant numbers of our most at risk women live in some of the more remote locations. It is important that care is configured appropriately to ensure that women, as far as possible, obtain the 'right care, at the right time, in the right place, by the right person'. To achieve that, it means that we must have systems of care that meet the needs of women; that care is provided, as much as is possible, close to where they live. There needs to safe systems in place for transfer in the event of pregnancy problems developing and that care is resourced adequately in hospitals, with appropriately trained staff and suitably built environments in which to practice. Provision of safe care for mothers and babies over great distances can pose challenges, and this can be affected by workforce shortages, especially in very remote areas.

During 2018–2019, the QMPQC considered some concerning problems, including the re-emergence of syphilis as a causative agent of congenital anomalies; the need to develop a pulse oximetry screening program for all neonates to screen for significant congenital heart disease at birth, and the emergence of suicide as the leading cause of late maternal death. The QMPQC, underpinned by its Sub-Committees, has made recommendations for practice improvements in all these areas.

As maternal morbidity and mortality from pregnancy related causes continues to decline, perinatal mental health conditions have emerged as significant areas of concern, in a health care sector which has historically been under-resourced, especially in rural and remote areas. The QMPQC wishes to highlight the need to recognise the critical role of adverse childhood experiences in a woman's overall mental health; the need to improve women's access to trauma informed care and the desperate shortage of appropriate perinatal mental health care.

The importance of appropriate workplace culture and provision of safe care also needs to be highlighted. There is increasing evidence that links behaviours such as bullying and workplace harassment with adverse patient outcomes. All staff should be encouraged to call out such behaviours. This was flagged in our previous report, and to date, systematic approaches to addressing these issues appear to have not been implemented.

An important initiative of the QMPQC has been to commence the perinatal contributing factors project which involved in-depth review of late gestation perinatal deaths. This review looked for contributing factors such as omissions in care, incorrect care and refusal of care to name a few. It is sobering to reflect that in over half of the selected perinatal deaths there were significant gaps in care. This has highlighted the need for more research in this area and for improvements in provision of care.

While the focus on this report is on how the system can improve, it is worth noting that we have an exceptional health care system which provides safe care for the vast majority of Queensland's mothers and babies. We are constantly in awe at the expertise, collaborative spirit, and relentless determination for the very best care that is embodied in our clinicians, administrators and consumer representatives. Our deepest gratitude to everyone who has made this report possible. We trust this report provides useful guidance in our never-ending quest for the very best start to life.

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Acknowledgements

The QMPQC acknowledges and respects the traditional owners and Aboriginal and Torres Strait Islander People, elders past, present and future, on whose land we work to support the provision of safe and quality healthcare.

Language used in this report: A note about gender and sexual orientation terminology: In this Report, the terms women, mothers, and pregnant women are used. Along with Aboriginal and Torres Strait Islander women. The term Indigenous has been used in the collation of data sets and in this report the word 'Indigenous' refers inclusively unless stated, to Australia's Aboriginal and Torres Strait Islander women and mothers. This Report acknowledges the limitations of this language used and is meant in no terms to offend, exclude or diminish individuals who do not wish to be associated with the language terms selected.

The work of the QMPQC is maintained by exemplary secretariat support and co-ordination, and a team of high-level perinatal epidemiologists, provided by the Queensland Department of Health, Patient Safety and Quality Improvement Service (PSQIS), Clinical Excellence Queensland (CEQ) and the Statistical Services Branch. Without this dedicated support, the QMPQC could not function.

Preparation of this report has been made possible through the support and guidance of the Queensland Department of Health, Statistical Services Branch with support from the PSQIS. Thanks especially to Miles Utz, Simin Arabshahi and Michelle Dinh for epidemiological analysis, data interpretation and for graciously attending to the many amendments requested along the way.

The Maternal Mortality and Perinatal Mortality Sub-Committees wish to acknowledge the support of staff in health information access; release of information; and patient safety and quality units of both public and private health services. Their timely response to requests for mortality information has greatly assisted with in-depth case review; identification of potential avoidable factors and the appropriate classification of the maternal and perinatal deaths included in this report.

All Queensland Hospital and Health Services and private healthcare providers are to be commended for:

- allowing staff who volunteer as members of the QMPQC and its Sub-Committees to take time during working hours to attend meetings and contribute to its quality assurance agenda. All recommendations and good practice points have been developed by members with their colleagues in mind, to assist them in providing best practice health care.
- accepting the invitation and supporting their staff to attend the education seminars, enabling attendees to share their gained knowledge with health service colleagues, fundamentally, benefiting the mothers and babies of Queensland.

The QMPQC also acknowledges and thanks the clinicians who participate in perinatal and maternal mortality reviews and classification through local case review committees. This is a critical function at the local level which contributes significantly to improving outcomes.

The contribution of consumers to the work of the QMPQC and its Sub-Committees is also acknowledged. Their input is appreciated in discussions at all levels and is of enormous value, especially in relation to the content of the QMPQC biennial reports and during mortality case reviews.

It is acknowledged that this is very much a collaborative report, with diversity in the data display and various writing styles.

The support of the following is also acknowledged with gratitude:

- Dr John Wakefield, former Director-General, Queensland Health
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- The Queensland State Coroners and the staff of the Office of the State Coroner
- Lucy Fisher, Executive Director, Private Hospitals Association of Queensland Inc.
- Dr Alicia Veasey, Co-Chair – Queensland Aboriginal and Torres Strait Islander Clinical Network.

Summary

This report focuses primarily on the 119,203 mothers who gave birth to 120,946 babies in Queensland in 2018 and 2019. This includes the 8618 (7.2 percent) women who identified as Aboriginal and/or Torres Strait Islander and their 8754 babies. Unless otherwise mentioned, all data relates to the years 2018 and 2019.

Mothers and pregnancy

The proportion of women giving birth at 35 years of age and over increased slightly between 2010 and 2019, while the proportion of mothers aged under 20 decreased. Birthing women of Aboriginal and Torres Strait Islander origin were approximately five times more likely to be aged under 20 than women of non-Aboriginal and Torres Strait Islander origin.

Multiple pregnancies represented 1.4 percent of all pregnancies with almost all (98.4 percent) being twins. One in five (19.5 percent) multiple pregnancies occurred where assisted conception techniques had been used.

Higher rates of antenatal care during the first trimester were found among women who gave birth in private facilities (93.7 percent) than among women who gave birth in public facilities (74.1 percent) or at home (69.1 percent).

Smoking during pregnancy was more common among women in Queensland than nationally (11.4 percent vs 9.9 percent), particularly during the first 20 weeks of pregnancy (11.4 percent vs 9.1 percent). Women who stop smoking during pregnancy can reduce the risk of adverse outcomes[1], and 18.1 percent of women who smoked in the first 20 weeks did not continue to smoke after 20 weeks gestation.

The proportion of women giving birth in private hospitals has not changed substantially over the last decade, with 76.2 percent of women giving birth in a public hospital and 22.8 percent giving birth in a private hospital. The overall rate of births with no labour in private facilities is much higher than the rate in public facilities (41.2 percent and 17.5 percent, respectively).

Babies and birth

Gestational age is an important determinant of perinatal outcome with 9.2 percent of babies born preterm (before 37 weeks) and 0.3 percent born post-term (42 weeks and over). There has been little change in these proportions over the past decade.

There has not been a significant change in the percentage of babies born with low birthweight (less than 2500g) over the past 10 years (6.4 percent in 2010 and 2011; 6.8 percent in 2018 and 2019). Babies born small for gestational age (SGA) are more prevalent for Aboriginal and Torres Strait Islander mothers 13.1 percent compared to 8.3 percent of SGA babies born to non-Aboriginal and Torres Strait Islander mothers.

The percentage of liveborn babies admitted to a special care or intensive care nursery was 26.9 percent, which is higher than the national average in 2019, of 18 percent, although these figures are not strictly comparable[2]. This is often due to being born preterm or due to a congenital anomaly (and sometimes both).

Congenital anomalies

Congenital anomalies are the leading cause of perinatal deaths in Australia. Queensland has had a significant increase in congenital hypothyroidism and ventricular septal cardiac defects over the past 12 years. These congenital anomalies are both associated with pre-existing diabetes.

Congenital Heart Defects (CHD) remain one of the leading causes of perinatal deaths in Queensland. Pulse oximetry screening (POS) performed during the birth admission has been implemented in only half of all Queensland birth hospitals. Routine POS for all births has been established on high level evidence to increase detection of CHD during the birth episode allowing earlier intervention and a reduced mortality and morbidity in critical CHD infants.

Congenital syphilis

In 2017, infectious syphilis and the re-emergence of congenital syphilis affecting babies in Queensland was identified as an important issue by the QMPQC. Consequently, a Congenital Syphilis Working Group (CSWG) was convened from 2018, tasked with the review of all Queensland cases of congenital syphilis that occurred between January 2010 and January 2022 (27 cases) and included 9 deaths.

There has been an infectious syphilis outbreak affecting young Aboriginal and Torres Strait Islander people in North Queensland since 2011. The South-East corner of Queensland has also experienced rapid increases of infectious syphilis in women of reproductive age (15–44 years) since 2016. This is concerning because of the increased risk of syphilis in pregnancy and congenital syphilis. In 2019, 66% of Queensland infectious syphilis notifications were from the highly populated South-East Queensland (SEQ) region. In that same year, the highest notification rates of infectious syphilis were reported in Aboriginal and Torres Strait Islander women.

The prevention of vertical transmission during pregnancy is key to avoiding poor outcomes for mothers and their babies.

1 Stillbirth Centre of Research Excellence Position Statement – Smoking – one of the most important things to prevent in pregnancy and beyond

2 Queensland data in this report are based on a broader ascertainment of intensive or special care, incorporating linked data from the Queensland Hospital Admitted Patient Data Collection in addition to the Queensland Perinatal Data Collection

Maternal mortality

There were 36 maternal deaths either during pregnancy or up to one year after the end of pregnancy. Seven of these deaths occurred in pregnancy or during the first six weeks postpartum. These were classified as direct or indirect, thereby contributing to a Maternal Mortality Ratio (MMR) for 2018 to 2019 of 5.0 per 100,000 births, which is slightly lower than the national figure of 5.7 per 100,000 births. Most prominently, 12 deaths in Queensland occurred by suicide, which continues to be a public health issue of concern that requires urgent attention. Six women died from cardiac conditions and four from malignancies.

Attention is drawn to the importance of mental health follow-up. Screening in the antenatal and postnatal period has been instituted in Queensland for several years. Still in many parts of Queensland there have not been resources dedicated for referral pathways and perinatal mental health services. There are also insufficient resources to care for women who are identified through screening processes, diagnosed with or at high risk of perinatal mental health concerns. The continuing lack of dedicated public mother-baby beds for women with significant perinatal mental health diagnoses is a major concern.

Suicide is the leading cause of maternal death and little is known about the circumstances in which these deaths occur.

Perinatal mortality

There were 1187 perinatal deaths, giving a perinatal mortality rate of 9.8 per 1000 births (stillbirth rate 6.8 per 1000 births, and neonatal mortality rate 3.0 per 1000 live births). The national perinatal mortality rate for the same period was 9.3 per 1000 births (stillbirth rate 7.1 per 1000 births, and neonatal mortality rate 2.2 per 1000 live births). The rate of stillbirths has not changed significantly over the decade 2010 to 2019 (annual percentage change: 0.3; 95 percent CI: −0.8, 1.3) while the neonatal death rate has declined modestly (annual percentage change: −1.8; 95 percent CI: −3.3, −0.2).

Babies born to Aboriginal and Torres Strait Islander women have higher rates of perinatal deaths. Stillbirths and neonatal deaths occur at 1.6 and 1.8 times the rate of babies born to non-Aboriginal and Torres Strait Islander women, respectively.

The leading cause of stillbirth was congenital anomaly, accounting for 38.3 percent of all stillbirths in 2018 and 32.6 percent in 2019. Almost one quarter (23.4 percent) of stillbirths in 2018 and 14.5 percent in 2019 were classified as unexplained. At term, those proportions increased to 44.4 percent in 2018 and 33.3 percent in 2019. Note: These percentages are based on Perinatal Society of Australia and New Zealand (PSANZ) classification. The classification of 2018 and 2019 cannot be compared due to different PSANZ classification codes.

The percentage of autopsies undertaken remains low, with 38.3 percent of stillbirth and 22.7 percent of neonatal deaths having an autopsy examination in Queensland.

While most stillbirths are due to antepartum fetal death, attention to intrapartum deaths is important due to the potential for prevention, particularly at late gestations.

In 2018, the leading cause of neonatal deaths was spontaneous preterm birth with related complications accounting for 41.6 percent of all neonatal deaths; in 2019, spontaneous preterm birth (30.8 percent) and congenital anomaly (30.3 percent) were the leading causes of neonatal deaths.

The Perinatal Mortality Sub-Committee undertook a review of selected perinatal deaths that occurred in the 12-month period from 1 January to 31 December 2019. The aim of the review was to classify the reported deaths to identify potentially modifiable factors that might improve care. This included organisational and/or management factors, personnel factors and barriers for women accessing care. Eighty-five of the perinatal deaths in 2019 occurred between 34 weeks gestation and 28 days postnatal age and met criteria for review. This included 66 (78 percent) stillbirths and 19 (22 percent) neonatal deaths. The review panel found that in more than half of the cases reviewed, there were critical gaps in care. Contributing factors were identified in 53 (62.3 percent) of the perinatal deaths reviewed, comprising of 38 stillbirths (57.6 percent) and 15 (78.9 percent) neonatal deaths. In 18 of the 53 cases (34 percent) with contributing factors, it was considered that sub-optimal care had significantly contributed to the outcome. Whilst this represents a decrease of nine percent in suboptimal care factors from the previous 2019 report, the results of the reviews echo previous critical gaps in care and missed opportunities. The findings from this body of work will also enable Queensland to meet its national reporting requirements with contributory factor data from in-depth clinical case reviews provided to the Australian Institute of Health and Welfare (AIHW).

Recommendations

- That Queensland Health develop strategies to improve access to culturally safe antenatal care, to increase early engagement and frequency of attendance by Aboriginal and Torres Strait Islander women.
- That attention be given to increasing the rate of first antenatal visit prior to 14 weeks gestation, to allow for early intervention that might reduce a variety of adverse maternal and perinatal outcomes.
- That all newborn infants in Queensland receive mandatory pulse oximetry screening at their birth admission. Current findings in Queensland and internationally strongly support that universal pulse oximetry screening reduces both morbidity and mortality in infants with undetected critical congenital heart disease.
- That consideration be given to the diagnosis of congenital syphilis in any critically unwell infant; symptoms may include non-specific signs such as anaemia, thrombocytopaenia, hepatosplenomegaly, fever and rash.
- That complete parallel testing of infant and mother be performed in all infants at risk of congenital syphilis, including rapid plasma reagin (RPR), infant syphilis antibodies (EIA IgM) and placental syphilis polymerase chain reaction (PCR).
- That follow-up serology be conducted at 3, 6 and 12 months of age or until RPR is nonreactive to ensure treatment is effective.
- That treatment of congenital syphilis be 10 days of intravenous benzylpenicillin.
- That reducing congenital syphilis in Queensland requires RPR testing of pregnant women, of up to 5 times throughout pregnancy, if considered to be at elevated risk, with monitoring of pregnant women after syphilis treatment for reinfection, and inclusion of partner screening/treatment and documentation.
- Develop a Queensland clinical guideline on perinatal mental health.
- That an urgent review be undertaken of perinatal mental health services, to ensure adequate resourcing and access, to identify current gaps.
- That education around suicide safety planning and accessing acute mental health care be available to all health professionals and agencies who see women in the peripartum.
- That comprehensive perinatal mental health services across the continuum of ambulatory care, consultation, liaison and inpatient beds be implemented state-wide.
- That all Maternity Care Providers receive education about Complex Trauma, and the principles of trauma informed care.
- That a dedicated mothers page be added to the Personal Health Record Child Health Information (PHR CHI) booklets documenting conditions or diseases incurred during pregnancy, highlighting the need for monitoring and follow-up alongside neonatal monitoring.

That all women should leave hospital with an agreed postnatal care plan which includes details of the practitioner, medical practice or community centre providing follow-up care, significant issues requiring follow-up, and a contraceptive plan.

That women should be provided with information on what to expect in the first 6 weeks postpartum in addition to the Baby's Personal Health Record (red book) and Child Health Information Guide to the first 12 months.

That maternity units delivering more than 3000 babies a year should have an obstetric medicine service on site.

That hospitals providing care with less than 3000 births per year should have strong links with an obstetric medicine department at their referring hospital.

In sites using electronic medical records, an electronic solution needs to be developed that allows for timely data sharing between hospital providers, GPs, midwives and women.

That an autopsy, and where appropriate and available, molecular investigations, be performed in all cases of maternal mortality. Consideration should be given to amending the Queensland Coroners Act 2003 to include investigation of all maternal deaths (including late deaths), except where there is a clear and unequivocally diagnosed cause of death, for example, a known metastatic malignancy.

That a systematic approach to reporting and reducing workplace intimidation, bullying, harassment and poor culture be developed for state-wide implementation within all Queensland hospitals.

That Queensland Health consider designating appropriately resourced tertiary perinatal pathology centres, for the performing of perinatal and neonatal autopsy investigation by perinatal pathologists. This, together with appropriate staffing, to ensure timely high-quality investigation of stillbirths and neonatal deaths, is vital.

That all maternity hospitals have effective processes (e.g. via Perinatal and Maternal Mortality Review Committees (PMMRCs) in place to ensure all perinatal deaths are appropriately investigated and classified according to the PSANZ national guidelines, for cause of death and contributing factors relating to care.

That all larger maternity facilities should have credentialled educators to deliver IMPROVE (Improving Perinatal Review and Outcomes via Education) workshops to help increase the uptake of perinatal autopsies and investigations in Queensland.

That all maternity services should standardise their perinatal mortality reviews and incorporate the APMCAT into their local perinatal mortality reviews. The resulting underlying causes of stillbirths should be classified using the PSANZ perinatal mortality classification system and include an assessment of suboptimal care factors.

Consideration to be given to establishing a permanent part-time (0.4FTE) clinical midwife resource to provide discipline specific input across all areas of review by the QMPQC.

Mothers and pregnancy

Births in Queensland

In 2018 and 2019, 119,203 mothers gave birth to 120,946 babies. The number of mothers giving birth and the number of babies born each year for the last 10 years are shown in Table 1. While the number of births has remained relatively stable, the fertility rate has decreased from 2.1 to 1.7 over the same time period[3].

Table 1: Number of mothers and babies, Queensland, 2010–2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mothers	61,027	61,126	62,667	62,182	62,811	60,942	61,876	59,399	59,644	59,559
Babies	62,032	62,182	63,727	63,172	63,824	61,903	62,779	60,326	60,503	60,443

Maternal age

The proportion of mothers aged 35 and over increased slightly from 19.9 percent in 2010 to 22.0 percent in 2019, while the proportion of mothers aged under 20 years decreased from 5.5 percent to 2.9 percent. Aboriginal and Torres Strait Islander mothers were approximately five times more likely to be aged less than 20 years than non-Aboriginal and Torres Strait Islander mothers (11.6 percent vs. 2.3 percent) and were approximately half as likely to be 35 years and older (10.4 percent vs. 22.5 percent).

Older maternal age was associated with a higher risk of complications and adverse outcomes. For example, mothers 35 years and older had increased rates of gestational diabetes and hypertension. They also had higher rates of adverse outcomes compared with women aged 20–34 years, including high rates of antepartum haemorrhage, babies with a chromosomal congenital anomaly, preterm birth and stillbirth, even after adjustment for parity (where applicable). Further details about rates of complications and adverse outcomes in older mothers compared with those observed for women aged 20–34 years are available in Statbite#75 (Morbidity and mortality associated with older maternal age at birth, Queensland, 2014 and 2015)[4]. Younger mothers (those less than 20 years of age) are at increased risk of being underweight, smoking during pregnancy and having a preterm birth, compared to women aged 20–34 years. They are also less likely to receive the recommended minimum number of antenatal visits. Models of antenatal care that promote continuity of care by the same provider have a very important role in reducing these risks for a range of socially disadvantaged women.

Multiple pregnancies

In 2018 and 2019, multiple pregnancies represented 1.4 percent of all pregnancies. Almost all multiple pregnancies (98.4 percent) were twins. Assisted conception techniques were used in 19.5 percent of all multiple pregnancies.

Women aged 35 years or older were 3.5 times as likely to have a multiple pregnancy compared to women less than 20 years, and 1.4 times as likely as women aged 20–34. However, as 12.9 percent of pregnancies among mothers 35 and older were a result of assisted conception techniques (compared with 4.0 percent for mothers under 35 years), it is important to distinguish between these effects. Among women who did not use assisted reproductive technology (ART) to conceive,

3 Australian Bureau of Statistics. Births, Australia

4 Statbite#75 Morbidity and mortality associated with older maternal age at birth, Queensland, 2014 and 2015.

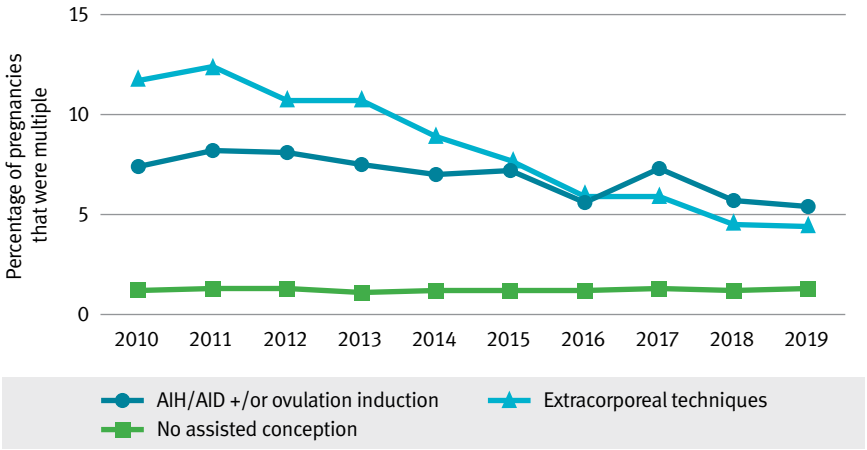
multiple pregnancies were 2.5 times as likely in women 35 years and older than in women less than 20 years and 1.1 times higher than in women aged 20–34, suggesting an independent effect of age.

Babies of multiple pregnancies have a higher risk of being born preterm (less than 37 weeks gestation). Of multiple pregnancies, 69.3 percent resulted in preterm births compared with 7.4 percent of singleton pregnancies. Of preterm multiple pregnancies, 55.3 percent had no labour; 10.8 percent had their labours induced and only 33.9 percent went into spontaneous labour. This indicates that most preterm births in multiple pregnancies are associated with obstetric intervention.

Assisted conception

Due to improvements in ART and clinical practice, there has been a steady decline in the proportion of multiple pregnancies conceived with various types of ART (Figure 1). There has been no change in the percentage of pregnancies conceived with ovulation induction and/or artificial insemination that are multiple.

Figure 1: Multiple pregnancies conceived with or without assisted conception. Queensland, 2010–2019



Pregnancies that utilised multiple assisted conception techniques are counted under each technique. As a result, categories are not mutually exclusive and cannot be summed.

AIH/AID/ovulation induction/donor egg/embryo transfer: artificial insemination and/or ovulation induction processes and/or donor egg and/or embryo transfer.

Extracorporeal techniques: in-vitro fertilisation, gamete intra-fallopian transfer, intracytoplasmic sperm injection, embryo transfer or related techniques.

Other/unknown/not stated assisted conception techniques are not graphed.

Further information regarding assisted conception and pregnancy outcomes can be found in Statbite#34 (Characteristics of women in Queensland who gave birth following conception by ART, 1998 to 2008)[5] and Statbite#39 (Trends in caesarean section rates amongst women giving birth following conception by ART in Queensland, 1998 to 2008)[6].

Good practice point

Due to the increase in adverse perinatal and maternal outcomes in women who conceive and carry a multiple pregnancy, it is important that practitioners providing assisted conception by whatever means adhere to contemporary evidence based clinical practice guidelines, to an auditable standard.

5 Statbite#34 (Characteristics of women in Queensland who gave birth following conception by ART, 1998 to 2008)

6 Statbite#39 (Trends in caesarean section rates amongst women giving birth following conception by ART in Queensland, 1998 to 2008)

Recommendation

That Queensland Health develop strategies to improve access to culturally safe antenatal care, to increase early engagement and frequency of attendance by Aboriginal and Torres Strait Islander women.

Recommendation

That attention be given to increasing the rate of first antenatal visit prior to 14 weeks gestation, to allow for early intervention that might reduce a variety of adverse maternal and perinatal outcomes.

Antenatal care

Attending less than the recommended minimum number of antenatal visits is associated with increased risk of adverse pregnancy outcomes including preterm birth, stillbirth, neonatal deaths and maternal deaths. In Queensland, it is recommended that all pregnant women receive at least five antenatal visits during pregnancy[7]. This level of antenatal care was achieved by 96.0 percent (based on women who gave birth at 32 weeks or more gestation). This is an increase from 94.2 percent in 2010. The proportion of Aboriginal and Torres Strait Islander women attending the recommended number of antenatal visits has also increased significantly from 78.8 percent in 2010 to 90.8 percent in 2019 but remains lower than for non-Aboriginal and Torres Strait Islander women.

Younger mothers (less than 20 years of age) were less likely to receive the recommended number of antenatal visits than older mothers (92.0 percent and 96.2 percent respectively; Table 2). This difference between younger and older mothers was evident for non-Aboriginal and Torres Strait Islander mothers (92.4 percent and 96.6 percent) but not for Aboriginal and Torres Strait Islander mothers (91.2 percent and 90.4 percent).

Table 2: Mothers birthing in Queensland, at least 32 weeks gestation, who attended five or more antenatal visits, by Aboriginal and Torres Strait Islander status of mother, 2018–2019

Aboriginal and Torres Strait Islander status of mother	Age	5+ visits	Number of mothers	% 5+ visits
Aboriginal and Torres Strait Islander mothers	<20	892	978	91.2
	20+	6,700	7,415	90.4
Non-Aboriginal and Torres Strait Islander mothers	<20	2,246	2,432	92.4
	20+	102,770	106,420	96.6
Total	<20	3,138	3,410	92.0
	20+	109,470	113,835	96.2

Women who attended an unknown or unspecified number of antenatal visits or gave birth at less than 32 weeks gestation are excluded. Women with an Aboriginal and Torres Strait Islander status of 'not-stated' are included in non-Aboriginal and Torres Strait Islander status counts.

It is recommended that the first antenatal visit occur in the first trimester (prior to 14 weeks gestation) to enable the early detection and management of pregnancy-related conditions, as well as other pre-existing factors which might impact on pregnancy outcome. Higher rates of antenatal care during the first trimester were found among women who gave birth in private facilities (93.7 percent) than among women who gave birth at home (69.1 percent) or in public facilities (74.1 percent). Aboriginal and Torres Strait Islander women were less likely to receive antenatal care in the first trimester (65.1 percent) compared to non-Aboriginal and Torres Strait Islander women (79.5 percent).

7 Australian Government Department of Health, Pregnancy Care Guidelines

Smoking during pregnancy

Smoking during pregnancy is associated with poor perinatal outcomes, including greater risk of low birth weight, being SGA, preterm birth and perinatal death[8]. In 2018 and 2019, 11.4 percent of women in Queensland smoked at some time during pregnancy. This was higher than the national percentage for the same period (9.9 percent)[8]. Percentages were higher before 20 weeks of pregnancy where 11.4 percent of mothers smoked compared with 9.3 percent who smoked at or after 20 weeks gestation. Nationally, for the same period, 9.1 percent of mothers smoked in the first 20 weeks of pregnancy. Smoking cessation during pregnancy is associated with improved pregnancy outcomes compared to women who continue to smoke[9]. In 2018 and 2019, 18.1 percent of women who smoked in the first 20 weeks did not continue to smoke after 20 weeks gestation. Aboriginal and Torres Strait Islander women were less likely to stop smoking after 20 weeks gestation (11.7 percent) compared to non-Aboriginal and Torres Strait Islander women (20.4 percent).

An analysis of the impact of smoking during pregnancy on adverse outcomes in Queensland found that the most influential risk factor was smoking at or after 20 weeks. Smoking after 20 weeks of pregnancy was associated with a 1.4 times higher risk of preterm births, after adjusting for other risk factors. Smoking is also an important risk factor for stillbirth[10]. Since 2010, there has been a steady decline in the proportion of women who reported smoking after 20 weeks gestation.

Higher rates of smoking after 20 weeks gestation persist among some groups:

- 37.5 percent of Aboriginal and Torres Strait Islander women smoked after 20 weeks gestation (down from 46.7 percent in 2010)
- 23.3 percent of younger women (those aged under 20 years) smoked after 20 weeks gestation compared to 9.5 percent of women aged 20–34 and 6.7 percent of women aged 35 and older
- 23.2 percent of women who lived in remote or very remote areas smoked after 20 weeks gestation compared to 6.6 percent in major cities
- 20.1 percent of women living in areas with the lowest socioeconomic status (SES) quintile smoked after 20 weeks gestation compared to 2.1 percent in the highest SES quintile
- There is variation, determined by Hospital and Health Service of usual residence, in the percentage of women who smoke after 20 weeks gestation[11].

Good practice point

Specialised, evidence-based programs to individually assist Aboriginal and Torres Strait Islander women and other high-risk groups to stop smoking before and during pregnancy should be prioritised, particularly those developed for groups of women with higher incidence of smoking during pregnancy.[12]

Get help from Quitline initiatives.Queensland.gov.au

Given that the smoking rates are highest amongst vulnerable women, smoking cessation programs need to be specifically targeted to women with high rates of trauma, low rates of education and literacy, and difficult life circumstances.

8 Australian Institute of Health and Welfare (AIHW) 2021, Australia's mothers and babies, viewed 10 May 2022

9 Stillbirth Centre of Research Excellence Position Statement – Smoking – one of the most important things to prevent in pregnancy and beyond

10 Flenady V et al. Major risk factors for stillbirth in high-income countries: a systematic review and meta-analysis. The Lancet 2011; 377:1331-40

11 Rate of perinatal mortality and selected perinatal risk factors, 2010-12p., and post-natal death 2008-10p., by Hospital and health Service of usual residence, compared with Queensland

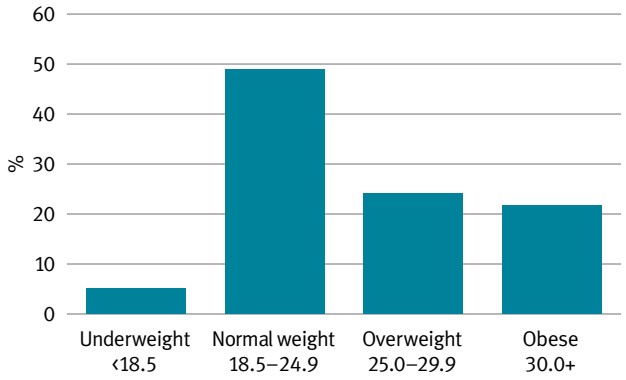
12 Research | The Centre of Research Excellence in Stillbirth (stillbirthcre.org.au)

Maternal weight

Among women who gave birth in Queensland in 2018 and 2019:

- 21.8 percent were classified as obese (body mass index (BMI) of 30.0 or more)
- 24.1 percent were overweight (BMI of 25.0–29.9)
- 49.0 percent were in the normal weight range (BMI of 18.5–24.9)
- 5.1 percent were underweight (BMI of <18.5).

Figure 2: Distribution of BMI for women who gave birth in Queensland, 2018–2019



BMI based on self-reported weight and self-reported or measured height at conception.

Excludes mothers of unknown BMI.

Maternal BMI is a risk factor for pregnancy and birth complications. For example, higher pre-pregnancy BMI has been linked to a greater risk of gestational diabetes and hypertension; pre-eclampsia; caesarean section; thromboembolism; postpartum haemorrhage and wound infections. Babies of obese mothers have a higher risk of macrosomia, some congenital anomalies, stillbirth and neonatal death[10, 13, 14, 15]. Higher rates of mothers who were overweight or obese were observed in older mothers, multiparous mothers and mothers who smoked during pregnancy[16]. However, a higher rate of many of these complications was observed among births to overweight and obese women even after adjusting for these factors. Further information on the impacts of maternal BMI ≥ 25 can be found in Statbite#79 (Maternal overweight and obesity in Queensland, 2008 to 2017)[17].

Place of birth

Most women in Queensland (96.8 percent) gave birth in a hospital, with only 2.2 percent giving birth in a birthing centre, 0.2 percent (n= 273) at home and 0.8 percent (n= 912) in other locations, including those where the birth occurred before arrival at hospital. For 76.2 percent of women the birth occurred in a public hospital and for 22.8 percent in a private hospital. This is comparable to national rates where 74.9 percent of women gave birth in a public hospital[8]. The proportion of women giving birth in private hospitals has not changed substantially over the last decade.

Women giving birth in public hospitals tend to have higher risk pregnancies. In 2018 and 2019:

- 23.5 percent who gave birth in public facilities were obese compared with 15.5 percent who birthed in private hospitals
- 11.9 percent who gave birth in public facilities smoked after 20 weeks compared with 0.3 percent who birthed in private hospitals
- 95.3 percent of women who gave birth in public facilities attended the recommended minimum number of antenatal visits compared with 99.0 percent who birthed in private hospitals
- Only 2.1 percent of Aboriginal and Torres Strait Islander women gave birth in a private hospital compared with 24.4 percent of non-Aboriginal and Torres Strait Islander women.

Women giving birth in private hospitals tended to be older than women who birth in public hospitals (33.8 percent were 35 years and older compared to 18.1 percent, respectively) and were more likely to have an assisted conception. Public hospitals had a higher proportion of younger women (under 20 years of age) (3.8 percent) than private hospitals (0.1 percent).

Onset of labour

The onset of labour may be either spontaneous or induced. When a birth is categorised as 'no labour' this means it occurred by caesarean section prior to any labour commencing.

Just under half (45.3 percent) of women had a spontaneous onset of labour, almost one third (32.0 percent) of women had their labour induced and 22.7 percent had no labour. The proportion of women whose labour began spontaneously has declined steadily over the last decade, from 57.1 percent in 2010 to 45.3 percent in 2019.

13 CMACE & RCOG (Centre for Maternal and Child Enquiries & Royal College of Obstetricians and Gynaecologists) 2010. Management of women with obesity in pregnancy. CMACE/RCOG Joint Guideline

14 Utz M, Johnston T, Zarate D, Humphrey M. A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland. Health Statistics Branch, Queensland Health. 2014

15 Watson M, MacLeod SL, Cornes S, Howell S. Maternal obesity and selected pregnancy risks and outcomes in nulliparous mothers in Queensland, 2008. Statbite#27. Health Statistics Centre, Queensland Health. 2010

16 Fraser M, Utz M, Johnston T. Maternal overweight and obesity in Queensland, 2008 to 2017. Statbite#79. Statistical Services Branch, Queensland Health. 2019

17 Statbite#79 Maternal overweight and obesity in Queensland, 2008 to 2017

Over this period there was a substantial increase in the proportion of women whose labour was induced from 22.3 percent in 2010 to 31.8 percent in 2019 and a small increase in the proportion with no labour, that is, caesarean section before labour onset (from 20.7 percent in 2010 to 22.9 percent in 2019).

Table 3 shows the 10 most frequent primary reasons for induction of labour (ICD-10-AM) in the last 10 years and the change in these from 2010 to 2019. While the number of pregnancies that are induced due to prolonged pregnancy has decreased, the number of pregnancies induced due to maternal care for other specified fetal problems and maternal care for excessive fetal growth have increased. Evidence suggests improved perinatal outcomes from induction of labour for fetal macrosomia (birth weight >4500g) at 39 weeks[18].

Aboriginal and Torres Strait Islander women had slightly higher rates of spontaneous onset of labour (52.4 percent), slightly lower rates of induction (30.6 percent) and no labour (17.0 percent), compared with non-Aboriginal and Torres Strait Islander women.

The mode of onset of labour varies by facility sector over time (Figure 3). In 2018 and 2019 women in public hospitals were much more likely to have a spontaneous onset of labour (49.7 percent) than women in private hospitals (28.1 percent) and much less likely to have no labour (17.5 percent vs 41.2 percent). The rate of women undergoing induction of labour has increased in the public sector over the last decade (21.5 percent in 2010–2011 to 32.8 percent in 2018–2019) and is now comparable with the rate in the private sector (30.7 percent).

Rates of induction of labour in selected women (first time mothers) and in all women in Queensland by hospital are shown in www.health.Queensland.gov.au/hsu/dashboards/ncmi_funnel.xlsm.

Good practice point

It is important that care is individualised for each woman. When deciding to induce labour, it is important to assess the potential risks for the mother and the baby from early term birth. There should be an evidence-based reason for each induction or elective caesarean section that attempts to avoid, where possible, late prematurity, as outlined in campaigns such as 'Every Week Counts'[19].

19 Every Week Counts – The last few weeks of pregnancy are important for your baby's health and development

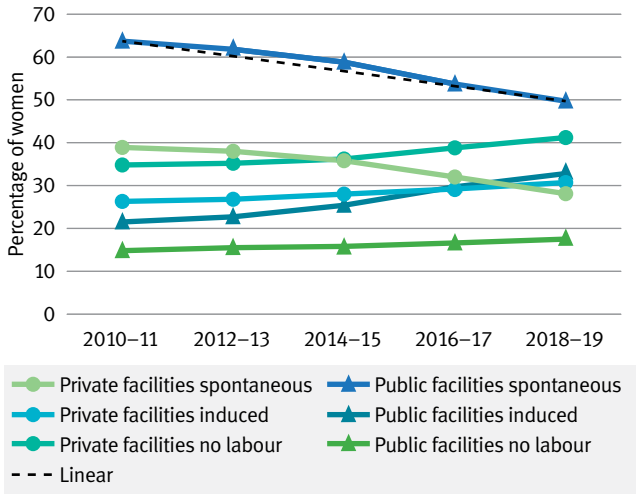
Table 3: Most frequent primary reasons for induction of labour, Queensland, 2010–2019

		Frequency		% of induction	
	ICD 10 AM code	2010	2019	2010	2019
O48	Prolonged pregnancy	3,666	2,143	27.0	11.3
Z34.8	Supervision of other normal pregnancy	1,652	1,555	12.2	8.2
O42.0	Premature rupture of membranes, onset of labour within 24 hours	973	834	7.2	4.4
O36.5	Maternal care for poor fetal growth	544	1,334	4.0	7.0
O42.11	Premature rupture of membranes, onset of labour between 1–7 days later	758	685	5.6	3.6
Z34.0	Supervision of normal first pregnancy	658	960	4.8	5.1
O13	Gestational [pregnancy-induced] hypertension	718	708	5.3	3.7
O24.42	Diabetes mellitus arising during pregnancy, insulin treated	437	1,085	3.2	5.7
O36.6	Maternal care for excessive fetal growth	283	1,633	2.1	8.6
O36.8	Maternal care for other specified fetal problems	93	1,766	0.7	9.3
	Total inductions	13,579	18,930	100.0	100.0

For multiple births, mother was categorised by the reason of induction recorded for the first baby.

18 Induction of labour vs Expectant Management for Large For dates Fetuses: a Randomised Controlled Trial. www.thelancet.com. Published online April 9, 2015

Figure 3: Onset of labour by facility sector, for women birthing in Queensland, 2010–2019

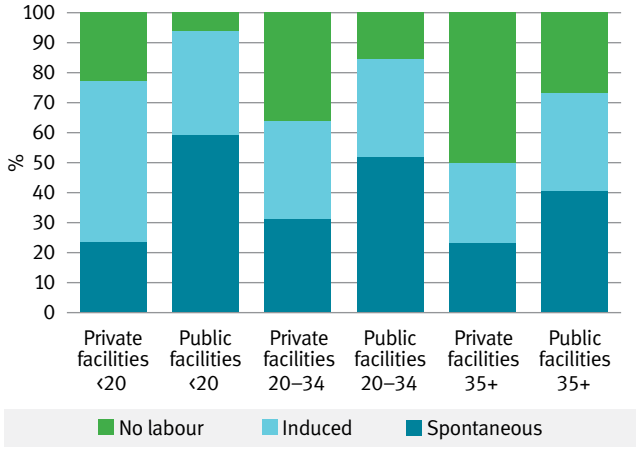


For multiple births, mother was categorised by the labour onset of the first baby.

Women who gave birth before arrival, home birthing, free birthing or birthing at an unknown facility not tabulated.

The rate of induction of labour varied with gestational age. A high proportion of births over 41 weeks were the result of induction (52.5 percent). For term births (37–41 weeks) the induction rate was slightly higher in public hospitals (33.9 percent) compared with private hospitals (32.1 percent). There was a correspondingly higher spontaneous labour rate in public hospitals. For babies born prior to term (32–36 weeks) more than half (53.4 percent) of births in private hospitals were by caesarean section (no labour) compared with just less than a third (31.4 percent) in public hospitals.

Figure 4: Labour onset distribution by maternal age, public and private facilities, 2010–2019



For multiple births, mother was categorised by the facility/labour onset of the first baby.

Women who gave birth before arrival, home birthing, free birthing or birthing at an unknown facility not tabulated.

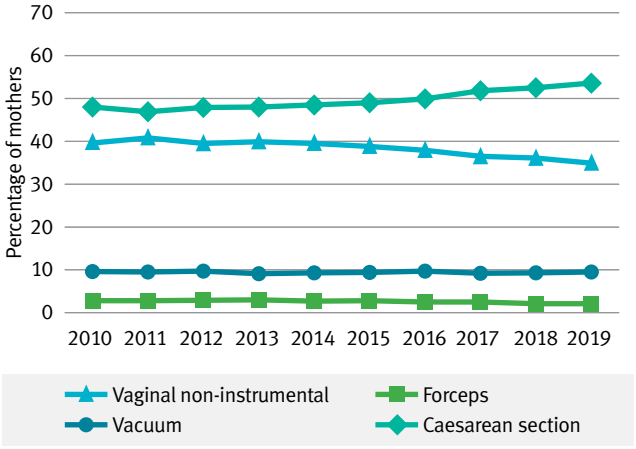
Figure 4 shows that women aged 35 and older had a higher rate of caesarean section births without labour in private hospitals, while women in the same age range had a higher rate of spontaneous births in public hospitals. Within each age group, the proportion of no labour caesarean sections was higher in private hospitals.

Method of birth

In 2018 and 2019, 54.2 percent of births were vaginal non-instrumental births; 35.4 percent were by caesarean section and 10.3 percent were instrumental vaginal births (7.6 percent vacuum extraction and 2.7 percent forceps). In the last decade there has been a decrease in vaginal non-instrumental births and a slight increase in caesarean section and vacuum extraction assisted births, in both public and private facilities (see Figures 5 and 6).

In 2018 and 2019, women birthing in a private hospital were more likely to have a caesarean section than women in public hospitals (53.0 percent compared with 30.6 percent). This has also been observed elsewhere in Australia and in other Organisation for Economic Co-operation and Development (OECD) countries[8, 20].

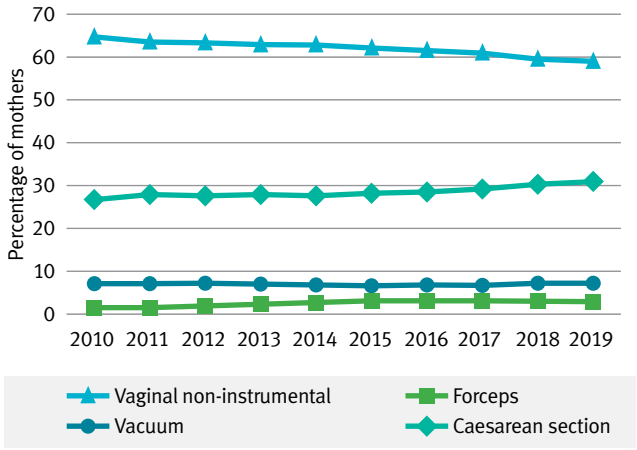
Figure 5: Method of birth of babies in private facilities, Queensland, 2010–2019



For multiple births, mother was categorised by the facility/birth method of the first baby.

20 Organisation for Economic Co-operation and Development (OECD) 2017. Health at a glance 2017: OECD indicators. Paris: OECD Publishing. Viewed 26 July 2019

Figure 6: Method of birth of babies in public facilities, Queensland, 2010–2019



For multiple births, mother was categorised by the facility/birth method of the first baby.

Aboriginal and Torres Strait Islander mothers

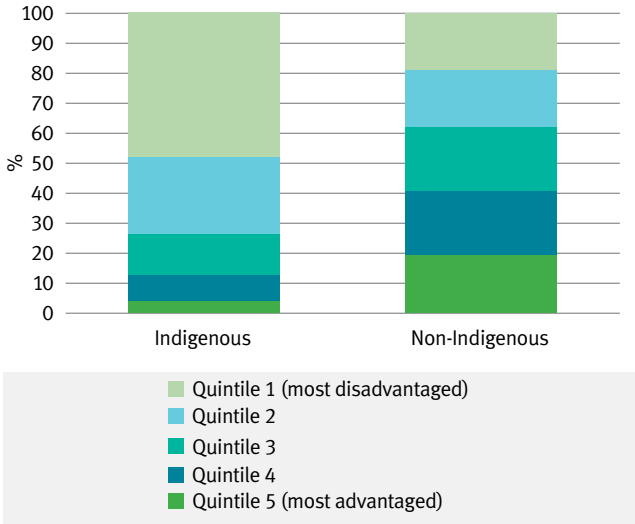
Cultural safety is essential for engaging Aboriginal and Torres Strait Islander women in maternity care[21]. In 2018 and 2019, 8618 women giving birth in Queensland identified as Aboriginal and/or Torres Strait Islander, representing 7.2 percent of women giving birth, compared to 4.7 percent nationally[8].

Aboriginal and Torres Strait Islander women gave birth to 8754 babies of which 96.1 percent were identified as being of Aboriginal and/or Torres Strait Islander origin. Most health indicators use the Aboriginal and Torres Strait Islander status of the mother to define Aboriginal and Torres Strait Islander status for the birth event, because these indicators are primarily designed to monitor pregnancy outcomes for these women. For further information about risk indicators for Aboriginal and Torres Strait Islander mothers and babies, please see Statbite#67 (Identification of Indigenous status for measurement of perinatal risk factors and outcomes: Insights gained through use of both mother and baby status)[22].

Aboriginal and Torres Strait Islander women giving birth in Queensland have higher rates of disadvantage, and higher rates of risk factors and adverse outcomes than non-Aboriginal and Torres Strait Islander women (Figure 7). Issues highlighted in earlier sections of this report that relate to Aboriginal and Torres Strait Islander women and their babies include:

- Aboriginal and Torres Strait Islander women are more than five times as likely to have babies when aged less than 20 years, which carries a higher risk of complications and adverse outcomes (see page 8)
- Though improvement has occurred over the last 10 years, Aboriginal and Torres Strait Islander women were less likely than non-Aboriginal and Torres Strait Islander women to receive the recommended minimum number of antenatal visits in 2018 and 2019 (see page 10)
- Aboriginal and Torres Strait Islander women had much higher rates of smoking during pregnancy than non-Aboriginal and Torres Strait Islander women (see page 11)
- Aboriginal and Torres Strait Islander women had higher rates of obesity, gestational diabetes, pre-existing diabetes, and chronic hypertension, than non-Aboriginal and Torres Strait Islander women[16]
- Aboriginal and Torres Strait Islander women were very unlikely to give birth in a private hospital and had lower rates of intervention such as induction of labour (see page 12 and 13).

Figure 7: Mothers who gave birth in Queensland hospitals, by Aboriginal and Torres Strait Islander status and SEIFA, Queensland, 2018–2019



Excludes non-Queensland residents.

21 Growing Deadly Families Strategy

22 Statbite#67 (Identification of Indigenous status for measurement of perinatal risk factors and outcomes: Insights gained through use of both mother and baby status)

Babies and birth

Gestational age

This section refers to the gestational age of the baby in completed weeks as determined by clinical assessment after birth and is an important determinant of pregnancy outcome. For example, preterm births (prior to 37 weeks gestation) accounted for 86.7 percent of perinatal deaths occurring during this time period.

In 2018 and 2019, 9.2 percent of babies were born preterm and 0.3 percent were born post-term (42 weeks and over). There has been some change in these proportions over the past decade, with a statistically significant increase in preterm births from 8.7 percent in 2010 to 9.4 percent in 2019, and a statistically significant decrease in the post-term group from 0.6 percent of births in 2010 to 0.3 percent of births in 2019.

Factors that increase the risk for preterm birth include multiple pregnancy, maternal underweight; smoking during pregnancy; pre-existing or gestational diabetes; pre-existing or gestational hypertension and older maternal age (35 years and older).

Other factors, such as the presence of a fetal congenital anomaly, a previous stillbirth, a previous caesarean section and having pre-eclampsia, also resulted in the earlier birth of babies. Iatrogenic prematurity, resulting from medical interventions, is also a significant factor, especially in multiple pregnancies.

A higher proportion of babies whose mothers are either of Aboriginal and/or Torres Strait Islander origin, live in remote locations or who are more socioeconomically disadvantaged are born at earlier gestations. A multivariate analysis of risk factors for preterm birth found that a mother's Aboriginal and Torres Strait Islander status, remoteness and socioeconomic status are not strongly associated with preterm birth once other risk factors are considered[23]. This suggests higher preterm birth rates in these groups are due to higher rates of other risk factors such as smoking, attendance at recommended levels to scheduling of antenatal visits and other complications such as gestational diabetes (see Table 4).

Table 4: Rate of selected perinatal risk factors, by Aboriginal and Torres Strait Islander status, SEIFA quintile and remoteness, 2018–2019

	Preterm (a)	<5 Antenatal visits (b)	Smoking after 20 weeks (c)	Obesity (d)
Aboriginal and Torres Strait Islander People	13.3	9.5	37.5	31.1
Non-Aboriginal and Torres Strait Islander People	8.9	3.5	7.1	21.1
Quintile 1 (most disadvantaged)	10.4	5.8	20.1	30.8
Quintile 2	9.6	3.8	12.0	25.5
Quintile 3	8.6	3.8	6.8	21.3
Quintile 4	8.7	3.5	4.4	18.4
Quintile 5 (most advantaged)	8.2	2.5	2.1	11.9
Unknown/interstate	20.0	6.9	6.0	20.3
Major city	8.8	4.1	6.6	19.7
Inner regional	9.5	3.8	12.9	26.3
Regional	9.5	3.4	14.3	24.6
Remote/very remote	11.1	4.8	23.2	28.7
Interstate	20.0	6.9	6.0	20.3

(a) Rate per 100 babies. Excludes babies of unknown gestational age.

(b) Rate per 100 mothers. Excludes mothers with unknown number of antenatal visits and births at less than 32 weeks gestation.

(c) Rate per 100 mothers. Excludes mothers of unknown smoking status after 20 weeks.

(d) Rate per 100 mothers. Excludes mothers of unknown BMI.

23 A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland. Utz M, Johnston T, Zarate D and Humphrey M. Health Statistics Branch, Queensland Health. 2014

The rate of preterm birth is similar in public (9.3 percent) and private facilities (9.2 percent). There is a much higher rate of caesarean section without labour in private facilities at earlier gestations than in public facilities (Figure 8). In early term deliveries (37–38 weeks), 80.3 percent of babies in private facilities were born by means other than spontaneous vaginal birth, compared to 62.6 percent of babies born in public facilities. Recent guidelines[24] recommend that planned births (by induction of labour or caesarean section) should ideally be performed as close to 40 weeks as possible. Shared decision-making about timing of birth for women is needed to enable them to make an informed decision, based on a clear understanding of their individualised risks and benefits which reflects their preferences and values. Timing of birth is the focus of one element in the Safer Baby Bundle initiative[25].

Birthweight

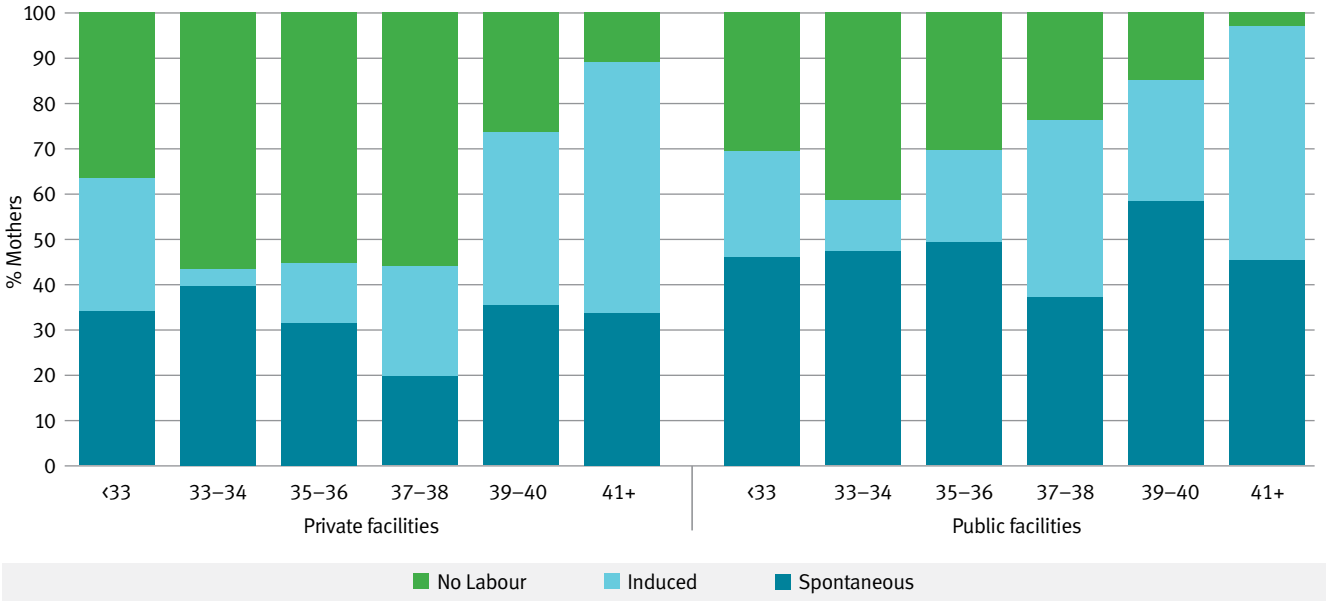
In 2018 and 2019, 6.8 percent of babies born were low birthweight (less than 2500g) and this rate has not changed substantially over the past 10 years (6.4 percent in 2010 and 2011).

While for most babies, low birthweight is strongly related to gestation (that is, babies born earlier are smaller), a subgroup of babies have weight-related complications or adverse outcomes that are independent of gestation. These babies are referred to as being small for their gestational age (SGA) and are commonly defined as the lowest 10 percent of weights within a group defined by gestational age and sex, according to national birthweight percentiles. Of particular clinical interest are babies who are SGA at or near term, as this can be the result of fetal growth restriction caused by placental dysfunction and can lead to adverse outcomes such as perinatal asphyxia and stillbirth. Improved detection of fetal growth restriction and earlier birth may help to reduce both mortality and morbidity.

Some characteristics of mothers are linked to an increased risk of giving birth to an SGA baby:

- 13.1 percent of babies of Aboriginal and Torres Strait Islander mothers were SGA compared with 8.3 percent of babies of non-Aboriginal and Torres Strait Islander mothers
- 13.2 percent of babies of mothers aged less than 20 years were SGA compared with 8.5 percent of babies of mothers aged 20–34 years
- 16.4 percent of babies of mothers who were underweight were SGA compared with 9.7 percent of babies whose mothers were in the normal weight range
- 16.6 percent of babies whose mothers smoked during pregnancy were SGA compared with 7.6 percent of babies whose mothers did not smoke.

Figure 8: Labour onset distribution by gestational age and facility sector, Queensland, 2018–2019



For multiple births, mother was categorised by the facility/labour onset of the first baby.

24 Perinatal Society of Australia and New Zealand and Centre of Research Excellence Stillbirth. Position statement: Improving decision-making about the timing of birth for women with risk factors for stillbirth. Centre of Research Excellence in Stillbirth, Brisbane, Australia, September 2019

25 Stillbirth Centre of Research Excellence. Safer Baby Bundle

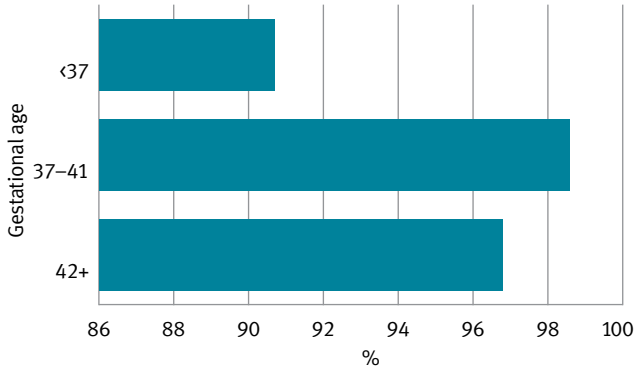
Neonatal morbidity

Neonatal morbidity is a term used to describe illness or injury in babies during the first 28 days of life. Monitoring neonatal morbidity is important to enable a better understanding of perinatal service requirements and to assist with monitoring of quality of care.

The Apgar score is a clinical scale used to describe a baby's condition at one minute and five minutes after birth based on **a**ppearance, **p**ulse, **g**rimace response to foot stimulation, **a**ctivity and **r**espiration (Apgar). It is used as an indicator of the health of the baby, which decides the need for and adequacy of resuscitation. An Apgar score of seven or more at five minutes indicates that the baby is adapting well to life directly after birth. An Apgar score of less than seven at five minutes is an indication of either poor adaptation or perinatal asphyxia.

In this period, 97.9 percent of liveborn babies had an Apgar score of seven or more at five minutes of age, whilst 2.1 percent had a score that was less than seven. The incidence of Apgar scores less than seven occurred more commonly for babies born at lower gestations (Figure 9).

Figure 9: Percentage of liveborn babies with an Apgar score greater than or equal to seven at five minutes, by gestational age, Queensland, 2018–2019

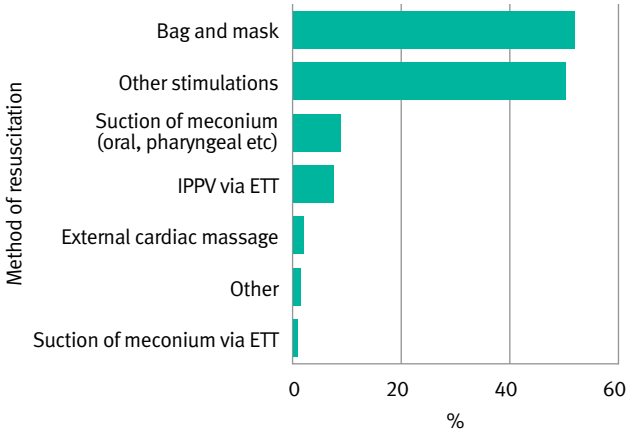


Excludes babies of unknown Apgar score at 5 minutes and/or unknown gestational age.

Resuscitation

16.2 percent of liveborn babies required some form of active resuscitation immediately after birth (excluding suction and facial oxygen). Two resuscitation methods, including continuous positive airway pressure (CPAP) ventilation and intubation, have been coded separately since July 2019. Thus, results for different methods of resuscitation are presented separately for these two time frames (Figure 10a and Figure 10b).

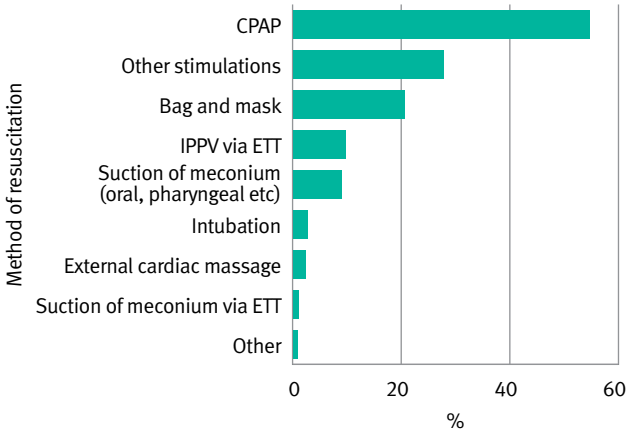
Figure 10a: Percentage of liveborn babies that received active resuscitation*, by resuscitation measure, Queensland, 1 January 2018–30 June 2019



A single baby could receive multiple resuscitation measures. Categories are not mutually exclusive.

* Excluding suction and facial oxygen.

Figure 10b: Percentage of liveborn babies that received active resuscitation*, by resuscitation measure, Queensland, 1 July – 31 December 2019



A single baby could receive multiple resuscitation measures. Categories are not mutually exclusive.

* Excluding suction and facial oxygen.

Length of stay in hospital

The median length of stay (LOS) for babies born in hospital was two days. This number includes babies who were transferred elsewhere but excludes babies who died. Factors impacting on LOS include gestational age, birthweight, method of birth and hospital sector. Complications of pregnancy, birth and co-morbidities affecting the mother or baby may result in a longer hospital stay. There has been a reduction in LOS globally in recent decades. However, these changes need to be interpreted with caution, as many maternal and neonatal factors can have an impact.

Length of stay varies between public and private sectors. In the public sector, median LOS for babies born vaginally is two days and caesarean section is three days. In comparison, in private sector hospitals, the median LOS for vaginal births was four days and for caesarean births was five days.

Length of stay is often used as a surrogate marker of morbidity. For babies born preterm, the median LOS was 11 days. For those born at term who were SGA, the median LOS was two days.

Examination of hospital LOS as a marker of morbidity needs to consider multiple factors including but not limited to: consideration of unintended impacts on breast feeding rates, neonatal readmission or emergency department presentation, peripartum mental health and parenting skills, facility capabilities including staffing and bed capacity.

Admission to special care and intensive care nursery

When there are complications or medical conditions affecting the baby, admission to the special care or intensive care nursery often occurs. In 2018 and 2019, 26.9 percent of liveborn babies (32,256 babies) were admitted to a nursery.

Of these, 8917 were preterm and 6460 had a congenital anomaly (note that these categories can overlap). There were 19,002 babies born at term who were admitted to a special care or intensive care nursery and did not have an identified congenital anomaly.

Transfer between hospitals

Some women and babies require transfer of care from one facility to another to enable access to a higher level of clinical service. Where possible, potential complications or medical conditions affecting the mother or baby will be identified before birth. Women are then booked antenatally into a hospital with an appropriate level of clinical service capability. This is one example of why a minimum of five antenatal visits is recommended and why antenatal care should start early in pregnancy. In other cases, women will require transfer just prior to, or during labour, or babies will require transfer after birth. This transfer may be required for emerging issues or for complications that were not detected during antenatal care, or where adequate antenatal care was not obtained.

Of those women who gave birth, 3.2 percent were transferred prior to the onset of labour, 0.9 percent were transferred during labour and 2.5 percent of babies were transferred to another hospital after birth.

The 10 most recorded reasons for antenatal transfer are shown in Table 5.

For those babies transferred after birth, 91.7 percent were admitted to a special care or intensive care nursery. The median length of stay for babies transferred after birth (excluding babies who died) was 16.5 days.

There was a higher perinatal mortality rate for all types of transfers than for the overall population, which reflects the higher rates of complications and medical conditions for babies where transfer was required.

Table 5: Top 10 reasons for antenatal transfer and percentage of transferred mothers birthing in Queensland, 2018–2019

Transfer reason description (ICD-10-AM)		Frequency	% of transferred mothers
Persons encountering health services in other specified circumstances	Z76.8	756	15.4
Unavailability and inaccessibility of health-care facilities	Z75.3	694	14.1
Maternal care for poor fetal growth	O36.5	295	6.0
Unavailability and inaccessibility of healthcare facilities	Z75.3	226	4.6
Premature rupture of membranes, onset of labour between 1–7 days later	O42.11	182	3.7
Maternal care for other (suspected) fetal abnormality and damage	O35.8	182	3.7
Obesity, not elsewhere classified, body mass index [BMI] ≥ 40 kg/m^2	E66.93	150	3.1
Other problems related to medical facilities and other health care	Z75.8	144	2.9
Maternal care for signs of fetal hypoxia	O36.3	132	2.7
Premature rupture of membranes, onset of labour within 24 hours	O42.0	131	2.7

There can be multiple reasons for transfer for an individual woman. Categories are not mutually exclusive.

Consumer guidance

The QMPQC is fortunate to have six consumer representatives as part of its membership. Their contribution to discussions provides insight from the perspective of mothers and families, which is highly valued. Areas for attention as expressed by consumers include:

Continuity of midwifery carer: Many issues identified in this report that affect the safety and quality of maternity care and the wellbeing of women and their babies would be improved by universal access to continuity of midwifery carer. The benefits, safety and cost effectiveness of continuity of midwifery carer, are well established and it should be amongst the first strategies considered to improve the quality and safety of maternity care for all women, regardless of risk.

Bereavement care: Bereavement midwives care is vital to grieving families, providing vital family support with education and care to staff members so they can in turn provide direction and guidance with compassion in these times. A bereavement midwife can direct families to additional local community support helping families transition from hospital to an important community support network, which is essential.

Congenital Anomaly: Families receiving a Congenital Anomaly diagnoses can feel overwhelmed, especially with the language and terms used when discussing conditions. It is important that families receive as much continuity of care with medical teams to ensure information given is consistent. Often families are left navigating a complex medical system with very little direction. Having a continuity of care midwife that supports the woman through her journey can help relieve a lot of this uncertainty.

Diagnostic testing and informed decision making: Women need to be informed regarding all available diagnostic testing and genetic screening, with clear explanation of the decision-making points that may come with the results of such tests. Several genetic screening tests are now available to aid in determining risk factors. However, these do not negate the need for diagnostic imaging such as morphology scans and should be used in conjunction to give the women the most accurate assessment. Ensuring that women have access to high quality, interactive antenatal education to make a truly informed decision is paramount. Informing women through print and digital means can be helpful but it does not replace the need for face-to-face education.

Perinatal mortality and autopsy: The review of contributory factors for perinatal mortality continues to be an important aspect of the QMPQC's remit. The social determinants of health are considered, and these enable a better understanding of health improvement strategies that tend to be outside of the normal data items in health reporting.

Recent changes to the autopsy consent form and consumer information brochure were welcomed by consumer representatives of the QMPQC, with these two documents complementing each other giving parents a better understanding of the choices available at such a difficult time.

Pregnancy health record: The pregnancy health record is an important opportunity for women to be actively involved in their care, along with an important conduit for communication between clinicians caring of the woman. While the implementation of an integrated electronic Medical Record (ieMR) may have many benefits, this report has highlighted issues it has created for communication between hospital and community-based maternity care providers. From a consumer point of view, the implementation of ieMR has also diminished women's access to their health records. Consideration needs to be given to strategies that tend to the fragmentation of care between hospital and community settings, as well as to reinstate information sharing with women.

Trauma-informed care: Consumers also strongly support the emphasis in this report on trauma-informed care, and in particular, the need for training for health care professionals. While accessing sufficient and timely antenatal care is known to reduce the risk of poor perinatal outcomes, the reasons that this sometimes does not occur are complex. When women do not access the recommended minimum number of antenatal visits there is an opportunity to reorientate health services and develop models of care that are acceptable and accessible to women. Such models of care are likely to be relationship-based, delivered in the community, close to where women live. As part of trauma-informed practice, maternity care providers must be alert to the possibility that maternity care experiences can be traumatic, even when they seem 'normal' or 'necessary' from a professional viewpoint. Taking a trauma-informed approach offers an opportunity to meet the woman's needs and addressing the reasons for disengagement.

Early term birth: This report has highlighted the increasing rate of induction of labour. Shared decision making about timing of birth is challenging for both women and maternity care providers to navigate. The need to consider stillbirth risk factors, the long-term health implications of early term birth, and risks to the woman of induction of labour all point to this being a particularly complex decision. As induction of labour becomes increasingly routine, women feel less involved in decision making. Strategies are needed to ameliorate this, including tools to support clear, timely and evidence-based discussions that increase the woman's capacity to be involved in her care and make an informed decision.

Maternal suicide: The suicide of women during or in the year after pregnancy is a tragedy for a family and the community, with enduring impact. Consumers commend the attention that has been paid in this and previous reports to perinatal mental health, and once again, echo the call for greater investment in this area, including increasing the capacity of in-patient mother-baby mental health services in Queensland.

Omissions: It is disappointing that the QMPQC is not resourced to review cases of serious maternal morbidity or consider data relating to women's experiences of care. In effect, this means that only maternal deaths receive review at this level. This is a missed opportunity to improve the safety and quality of maternity care in Queensland.

Congenital anomalies

Congenital anomalies remain an important cause of child disability and death. Congenital abnormalities contribute to 32 percent of perinatal deaths in Australia and are in the causal pathway of the largest proportion of perinatal mortality nationally[26]. In Queensland, careful population-wide reporting through the Queensland Perinatal Data Collection, on all births, as well as the notification of later detections and terminations by the Queensland Hospital Admitted Patient Data Collection (QHAPDC), have improved our ability to ascertain serial rates for most congenital anomalies.

The Congenital Anomalies Sub-committee of the QMPQC has legislative responsibility to monitor prevalence of congenital anomalies and their outcomes in all pregnancies, births and in children up to the age of 7 years of age across Queensland. This surveillance and reporting have fostered research and further investigations on specific congenital anomalies and recommendations for improvement have been made, including routine pulse oximetry screening (POS) of all newborns to reduce mortality and morbidity from critical congenital heart disease.

Congenital anomaly rates are reported based on a linked data resource, the Congenital Anomaly Linked File (CALF). Additional information on the CALF, as well as more detailed numbers and rates of congenital anomalies over time and for selected subgroups is available at https://www.health.Queensland.gov.au/hsu/dashboards/calf.xlsm.

A ranking table in order of prevalence of Queensland's congenital anomalies for 2018 and 2019 are shown in Table 6, with Talipes, Undescended Testis and Patent Ductus Arteriosus being the most commonly recorded congenital anomalies.

Congenital anomalies surveillance

Table 6: Order of prevalence of key congenital anomalies, Queensland 2018–2019

Congenital anomaly	Count	Rate per 1,000	One in number of pregnancies
Talipes	2,693	22.2	45
Undescended Testis (treated)	1,014	8.4	120
Patent Ductus Arteriosus	894	7.4	136
Atrial Septal Defects	867	7.1	140
Ventricular septal defect	663	5.5	183
Hypospadias	493	4.1	246
Obstructive defects renal pelvis	451	3.7	269
Developmental dysplasia of hip	265	2.2	458
Trisomy 21 Down Syndrome	251	2.1	483
Cleft Palate/Cleft Lip	211	1.7	575
Renal agenesis or dysgenesis	185	1.5	656
Polydactyly	179	1.5	678
Craniosynostosis	113	0.9	1,074
Pyloric Stenosis	110	0.9	1,103

26 Australian Institute of Health and Welfare (AIHW) 2021, Stillbirths and neonatal deaths, viewed 11 May 2022

Table 6: Order of prevalence of key congenital anomalies, Queensland 2018–2019

Congenital anomaly	Count	Rate per 1,000	One in number of pregnancies
Syndactyly	106	0.9	1,145
Microcephaly	86	0.7	1,411
Trisomy 18 Edward Syndrome	79	0.7	1,536
Reduction deformities upper and/or lower limbs	79	0.7	1,536
Coarctation of aorta	77	0.6	1,576
Transposition of great vessels	75	0.6	1,618
Branchial remnants	71	0.6	1,709
Congenital hypothyroidism	68	0.6	1,784
Spina Bifida	68	0.6	1,784
Disorders of amino acid transport and metabolism	66	0.5	1,838
Hypoplastic Left Heart Syndrome	54	0.4	2,247
Gastroschisis	52	0.4	2,333
Congenital hydrocephalus (excl. those with NTD+)	51	0.4	2,379
Cystic kidney disease	50	0.4	2,426
Tetralogy of Fallot	50	0.4	2,426
Stenosis/atresia anus	49	0.4	2,476
Anencephalus	47	0.4	2,581
Stenosis/atresia small intestine	44	0.4	2,757
Diaphragmatic hernia	39	0.3	3,111
Congenital cataract and lens anomalies	38	0.3	3,193
Choanal Atresia	37	0.3	3,279
Tracheo-oesophageal fistula, oesophageal atresia/stenosis	34	0.3	3,568
Vesico-ureteric reflux	33	0.3	3,676
Cystic fibrosis	32	0.3	3,791
Anotia or Microtia	31	0.3	3,913
Turner Syndrome (45,X)	30	0.2	4,044
Hirschsprung's disease	28	0.2	4,333
Trisomy 13 Patau	27	0.2	4,493
Exomphalos	20	0.2	6,066
Haemophilia	12	0.1	10,110
Disorders of carbohydrate transport and metabolism	12	0.1	10,110
Adrenogenital Syndrome	11	0.1	11,029
Encephalocele	11	0.1	11,029
G6PD deficiency	8	0.1	15,165
Fetal Alcohol Syndrome	8	0.1	15,165
Muscular dystrophies/myopathies	8	0.1	15,165
Phenylketonuria	6	<0.1	20,220
Microphthalmia	6	<0.1	20,220
Thalassaemia	5	<0.1	24,264
Anophthalmia	1	<0.1	121,318

Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland.
Includes cases where the birth was recorded in Queensland or the termination of pregnancy was conducted at a facility in Queensland.
Data are preliminary and subject to change. Subsequent reports are likely to show additional cases of congenital anomalies, as further morbidity details are determined in the 5 years following an individual's birth.
+ Neural Tube Defect (NTD).

Congenital hypothyroidism, Queensland

Congenital hypothyroidism is a sustained deficiency of thyroid hormone production due to abnormal hormone production, failure of formation of the thyroid gland or abnormal pituitary gland function from birth.

The trend has shown a significant increase between 2008 and 2019 (Figure 11). The Annual Percentage Change (95 percent CI) was: 7.53 (3.50, 11.71), p<.001.

Based on 5 years of data from 2015 to 2019, there was a 3.80 times elevated risk in multiple pregnancies. There was also a 3.87 times elevated risk in mothers with pre-existing diabetes (type 1 or type 2 diabetes before pregnancy). Reported smoking during pregnancy and mothers in the most disadvantaged SEIFA quintile were also at significantly higher risk (Table 7).

Figure 11: Congenital hypothyroidism rate per 1,000 births, Queensland, 2008–2019

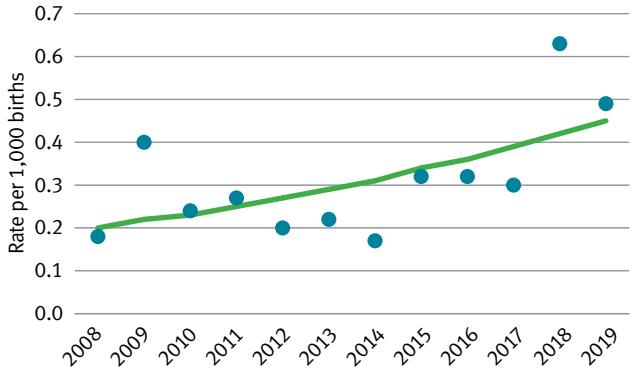


Table 7: Congenital hypothyroidism by selected maternal and child characteristics, 2015–2019

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	4	0.4	0.96 (0.35, 2.62), 0.940
	20–34 years	96	0.4	Reference
	35+ years	26	0.4	0.99 (0.64, 1.53), 0.961
Plurality (b)	Single	113	0.4	Reference
	Multiple	13	1.4	3.80 (2.14, 6.74), <.001
Sex (a)(b)	Male	63	0.4	Reference
	Female	63	0.4	1.06 (0.75, 1.51), 0.737
Pre-existing diabetes	No pre-existing diabetes	121	0.4	Reference
	Pre-existing diabetes	5	1.5	3.87 (1.58, 9.46), 0.003
BMI (a)(b)	Underweight <18.5	7	0.4	1.12 (0.51, 2.46), 0.770
	Normal 18.5–<25	58	0.4	Reference
	Overweight 25–29.9	20	0.3	0.74 (0.45, 1.24), 0.253
	Obese 30+	34	0.5	1.43 (0.93, 2.18), 0.100
Smoking during pregnancy (a)(b)	Smoked during pregnancy	25	0.7	1.85 (1.19, 2.86), 0.006
	Did not smoke during pregnancy	101	0.4	Reference
SEIFA (a)	Quintile 1 (most disadvantaged/ least advantaged)	41	0.6	1.87 (1.08, 3.22), 0.024
	Quintiles 2–4	66	0.4	1.07 (0.64, 1.79), 0.783
	Quintile 5 (most advantaged/ least disadvantaged)	19	0.3	Reference

(a) excludes cases where characteristic was indeterminate, missing or unknown.

(b) excludes terminations of pregnancy before 20 weeks gestation (0% of congenital hypothyroidism cases, and 0.3% of total births), as characteristic is not collected for these data.

(c) minor change in SEIFA boundaries occurred with changeover of ASGS structure on 1st July 2017.

Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland.
Queensland Perinatal Data Collection (QPDC), Department of Health, Queensland.
Queensland Hospital Admitted Patient Data Collection (QHAPDC), Department of Health, Queensland.

Ventricular septal defect, Queensland

Ventricular septal defect (VSD) is an opening across the muscular or membranous wall of the cardiac ventricles.

The trend has shown a significant increase between 2008 and 2019. The Annual Percentage Change (95 percent CI) was: 1.92 (0.96, 2.88), p<.001.

Based on 5 years of data from 2015 to 2019, there was a 3.10 times elevated risk in mothers with pre-existing diabetes (type 1 or type 2 diabetes before pregnancy) (Table 8). There was a 2.04 times increased risk in infants born from a multiple pregnancy, a 1.17 times increased risk in female infants and a 1.16 times increased risk in infants born to mothers of 35+ years of age. The finding of a reduced risk in the four most disadvantaged quintiles of SEIFA may reflect reduced access to diagnostic investigations with subsequent lowered ascertainment of VSD.

Figure 12: Ventricular septal defect rate per 1,000 births, Queensland, 2008–2019

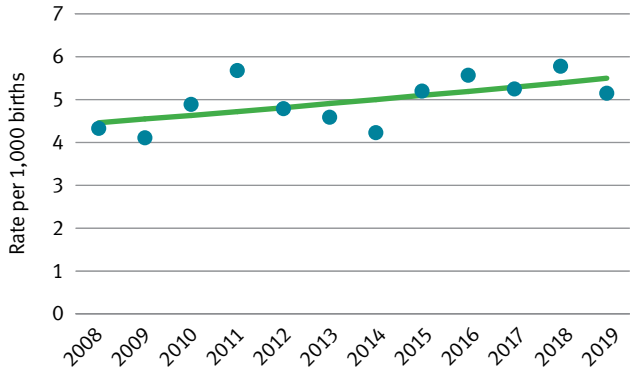


Table 8: Ventricular septal defect by selected maternal and child characteristics, 2015–2019

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	42	4.2	0.79 (0.58, 1.08), 0.140
	20–34 years	1,223	5.2	Reference
	35+ years	390	6.1	1.16 (1.04, 1.31), 0.009
Plurality (b)	Single	1,552	5.2	Reference
	Multiple	96	10.7	2.04 (1.66, 2.51), <.001
Sex (a)(b)	Male	785	5.0	Reference
	Female	862	5.8	1.17 (1.06, 1.28), 0.002
Pre-existing diabetes	No pre-existing diabetes	1,602	5.3	Reference
	Pre-existing diabetes	53	16.3	3.10 (2.35, 4.07), <.001
BMI (a)(b)	Underweight <18.5	106	6.5	1.22 (1.00, 1.50), 0.051
	Normal 18.5–<25	807	5.3	Reference
	Overweight 25–29.9	382	5.4	1.02 (0.90, 1.15), 0.742
	Obese 30+	312	5.0	0.94 (0.83, 1.07), 0.357
Smoking during pregnancy (a)(b)	Smoked during pregnancy	183	5.1	0.93 (0.80, 1.09), 0.381
	Did not smoke during pregnancy	1,461	5.4	Reference
SEIFA (a)	Quintile 1 (most disadvantaged/ least advantaged)	341	5.2	0.83 (0.72, 0.96), 0.015
	Quintiles 2–4	931	5.1	0.81 (0.72, 0.92), <.001
	Quintile 5 (most advantaged/ least disadvantaged)	355	6.3	Reference

(a) excludes cases where characteristic was indeterminate, missing, or unknown.

(b) excludes terminations of pregnancy before 20 weeks gestation (0.4% of total VSD cases, and 0.3% of total births), as characteristic is not collected for these data.

(c) minor change in SEIFA boundaries occurred with changeover of ASGS structure on 1st July 2017.

Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland.
Queensland Perinatal Data Collection (QPDC), Department of Health, Queensland.
Queensland Hospital Admitted Patient Data Collection (QHAPDC), Department of Health, Queensland.

Trisomy 21 Down Syndrome, Queensland

Trisomy 21 Down Syndrome is a chromosomal anomaly in which there are three copies of chromosome 21.

There was no significant trend detected between 2008 and 2019.

Based on 5 years of data from 2015 to 2019, there was an increase of 4.87 times for Trisomy 21 in mothers aged 35+ years (Table 9). There was an increase of 1.48 in incidence in mothers with obesity (BMI≥30). The apparent reduced incidence of Trisomy 21 in mothers in the most disadvantaged quintile remains unexplained without further analysis, but likely is due to over representation of younger mothers in the lowest SEIFA quintile.

Figure 13: Trisomy 21 Down Syndrome rate per 1,000 births, Queensland, 2008–2019

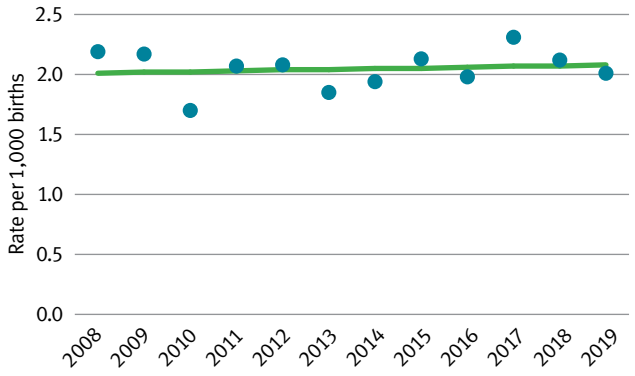


Table 9: Trisomy 21 Down Syndrome by selected maternal and child characteristics, 2015–2019

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	7	0.7	0.59 (0.28, 1.24), 0.165
	20–34 years	275	1.2	Reference
	35+ years	366	5.7	4.86 (4.16, 5.68), <.001
Plurality (b)	Single	341	1.1	Reference
	Multiple	10	1.1	0.97 (0.52, 1.81), 0.918
Sex (a)(b)	Male	178	1.1	Reference
	Female	173	1.2	1.03 (0.84, 1.27), 0.768
Pre-existing diabetes	No pre-existing diabetes	641	2.1	Reference
	Pre-existing diabetes	7	2.2	1.02 (0.49, 2.15), 0.955
BMI (a)(b)	Underweight <18.5	19	1.2	1.20 (0.74, 1.93), 0.464
	Normal 18.5–<25	148	1.0	Reference
	Overweight 25–29.9	78	1.1	1.14 (0.86, 1.49), 0.361
	Obese 30+	90	1.4	1.48 (1.14, 1.92), 0.003
Smoking during pregnancy (a)(b)	Smoked during pregnancy	40	1.1	0.97 (0.70, 1.35), 0.862
	Did not smoke during pregnancy	307	1.1	Reference
SEIFA (a)	Quintile 1 (most disadvantaged/ least advantaged)	116	1.8	0.77 (0.60, 0.98), 0.037
	Quintiles 2–4	384	2.1	0.91 (0.74, 1.11), 0.332
	Quintile 5 (most advantaged/ least disadvantaged)	131	2.3	Reference

(a) excludes cases where characteristic was indeterminate, missing or unknown.

(b) excludes terminations of pregnancy before 20 weeks gestation (approximately 46% of total Trisomy 21 Down Syndrome cases and 0.3% of total births), as characteristic is not collected for these data.

(c) minor change in SEIFA boundaries occurred with changeover of ASGS structure on 1st July 2017.

Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland.
Queensland Perinatal Data Collection (QPDC), Department of Health, Queensland.
Queensland Hospital Admitted Patient Data Collection (QHAPDC), Department of Health, Queensland.

Improving outcome for newborns with critical congenital heart disease in Queensland

Universal Pulse Oximetry Screening

Congenital Heart Defects (CHD) constitute one of the most common group of congenital anomalies with an incidence between four and ten per 1000 livebirths. CHD cases in Queensland account for more perinatal deaths than any other congenital anomaly. Babies born with critical Congenital Heart Defect (cCHD) are a higher risk subgroup where initial neonatal care is often urgent and complex[27, 28].

cCHD can be diagnosed by fetal ultrasound. However, in the previous 2016–2017 QMPQC Report[29], more than 60 percent of cCHD cases between 2007–2015 were missed using fetal ultrasound screening. Babies may lack clinical signs of cCHD in the first day of life, appearing pink despite having a critical 'cyanotic' heart lesion with lack of a murmur and an otherwise normal physical examination. Delayed diagnosis of cCHD after birth is associated with increased mortality and morbidity which appears avoidable, as reported in a large observational study from the USA where universal newborn pulse oximetry has been adopted[30].

Pulse oximetry screening (POS) has been widely adopted and assessed. A Cochrane Review (2018) included 457,202 infants and predicted that for every 10,000 babies screened that 5 cCHD cases would be detected and one missed (sensitivity 76 percent, 95 percent CI:69.5–82.0). A further 14 babies would test positive who did not have cCHD (false positive)[31].

An important finding in these false positive babies, across multiple studies, is that many were found to have serious, potentially life threatening non-cardiac medical conditions including respiratory or infective illnesses. These babies are usually classified as false positives, but it is generally accepted that early detection of these babies, before they become more unwell, is a significant advantage for their newborn care.

In Australia and New Zealand, uptake of routine POS has been strongly promoted with the earliest published guidelines in 2012. Reports of coverage by POS for all newborns have varied across state health jurisdictions ranging from more than 95 percent of all eligible newborns in Western Australia in a 2019 study[32] to an estimated 90 percent in South Australia and Victoria.

Following the finding of a high proportion of missed cCHD cases on fetal ultrasound in Queensland[28], the Queensland Maternal and Perinatal Quality Council (QMPQC) convened a Pulse Oximetry Screening Working Group in 2020 which examined existing evidence and recommended universal POS across all Queensland Maternity Facilities. This group surveyed all Queensland Health maternity sites and found approximately 50 percent of newborns were not receiving POS before their discharge from Queensland Birthing facilities.

Following consultation across stakeholders, POS has been recommended as mandatory for all newborns before discharge from their birth facility. Full information on the Queensland POS recommendation is available in Queensland Clinical Guideline: Routine Newborn Assessment Maternity and Neonatal Clinical Guidelines | Queensland Clinical Guidelines | Queensland Health

Recommendation

That all newborn infants in Queensland receive mandatory pulse oximetry screening at their birth admission. Current findings in Queensland and internationally strongly support that universal pulse oximetry screening reduces both morbidity and mortality in infants with undetected critical congenital heart disease[33].

27 Antenatal detection of treatable critical congenital heart disease Is associated with lower morbidity and mortality. Elza Cloete, Frank Bloomfield, Lynn Sadler, Monique de Laat, Kirsten Finucane, Thomas Gentles. J Pediatrics 2019; 204:66-70)

28 Outcome of infants with prenatally diagnosed congenital heart disease delivered outside specialist paediatric cardiac centres. Anagnostou K, Messenger L, Yates R, Kelsall W. Arch Dis Child Fetal Neonatal Ed 2012: F1-F4, doi:10.1136/archdischild-2011-300488

29 Report of the Queensland Maternal and Perinatal Quality Council 2019. Published by the State of Queensland (Queensland Health), May 2020

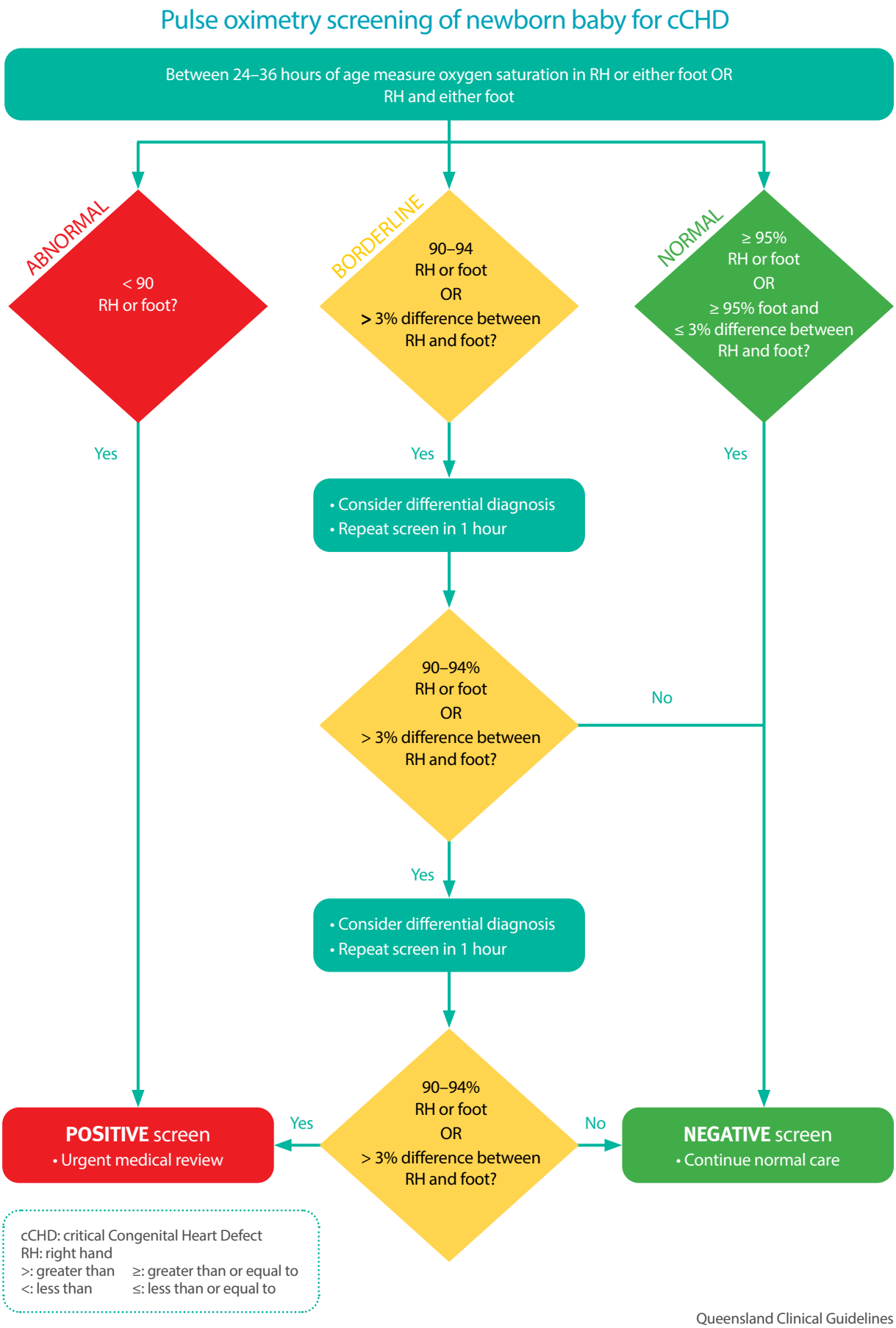
30 Association of US state implementation of newborn screening policies for critical congenital heart disease with early infant cardiac deaths. Abouk R, Grosse SD, Ailes EC, Oster ME. JAMA. 2017;318(21):2111–2118

31 Pulse oximetry screening for critical congenital heart defects. Maria Plana, Javier Zamora, Gautham Suresh, Luis Fernandez Pineda, Shakila Thangaratinam, Andrew K Ewer. Cochrane Library.

32 Pulse Oximetry Screening in Western Australia for detection of critical congenital heart disease, Vetten Z, Harris E, Ramsay J. Published 2019

33 Maternity and Neonatal Clinical Guideline: Newborn baby assessment (routine) https://www.health.qld.gov.au/__data/assets/pdf_file/0029/141689/g-newexam.pdf

Flowchart 1: Pulse oximetry screening of newborn baby for critical congenital heart disease



Queensland Clinical Guideline. Newborn assessment (routine). Flowchart: F21.4-4-V1-R26

Queensland Clinical Guidelines
www.health.qld.gov.au/qcg

Congenital syphilis

Notifications of infectious syphilis have continued to increase in Queensland from 340 cases in 2011 to 1,131 cases in 2019.[34] The ongoing infectious syphilis outbreak in northern Australia, first reported in 2011 among predominantly remote Aboriginal and Torres Strait Islander people, has contributed significantly to these rates. However, in 2019, 66% of Queensland infectious syphilis notifications were from the highly populated South-East Queensland (SEQ) region.

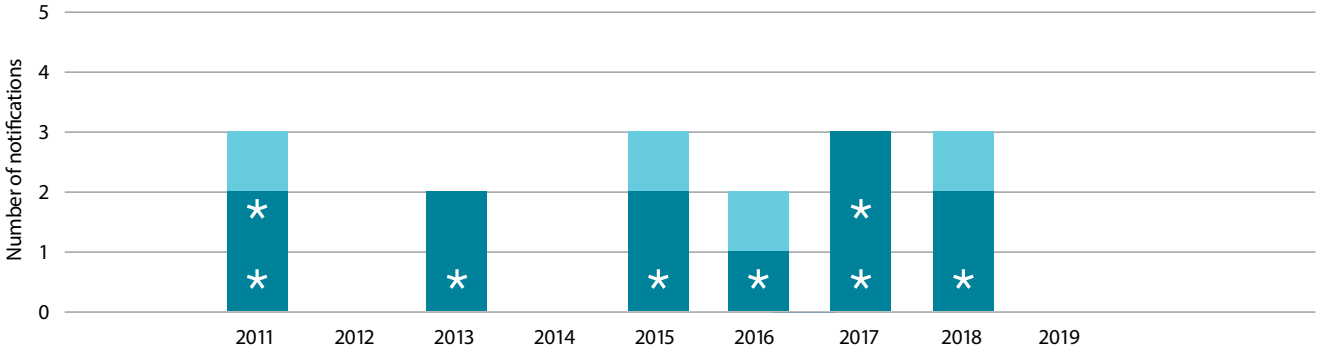
From 2011 to 2019, there were 190 infectious syphilis notifications and 127 late latent notifications in pregnant women in Queensland. In this time period, in SEQ there was a 20-fold increase in infectious syphilis notifications (from 4 cases to 83 cases) in non-Aboriginal and Torres Strait Islander women, 85% of whom were of reproductive age. Despite these increases in non-Aboriginal and Torres Strait Islander women, the burden of death associated with congenital syphilis continues to be among infants born to Aboriginal and Torres Strait Islander women.

Australia is a country of relatively low prevalence of congenital syphilis, however coinciding with increases in infectious syphilis notifications is the increased risk of congenital syphilis cases across remote, regional and more recently, metropolitan areas.[35] There were 16 congenital syphilis cases notified in Queensland between 2011 and 2019, including 8 deaths, all of which occurred in Aboriginal and Torres Strait Islander infants. (Figure 14).

34 Queensland Department of Health. Notifiable Conditions System. Extracted 7 October 2022.

35 Department of Health (2020) Clinical Practice Guidelines: Pregnancy Care. Canberra: Australian Government Department of Health.

Figure 14: Congenital syphilis notifications in Queensland, by Aboriginal and Torres Strait Islander status, 1 January 2011–31 December 2019.



	2011	2012	2013	2014	2015	2016	2017	2018	2019
Non-Indigenous	1	0	0	0	1	1	0	1	0
First Nations	2	0	2	0	2	1	3	2	0

* Denoting deaths in congenital syphilis cases.

Recommendation

Recognising congenital syphilis and managing infants appropriately include:

That consideration be given to the diagnosis of congenital syphilis in any critically unwell infant; symptoms may include non-specific signs such as anaemia, thrombocytopaenia, hepatosplenomegaly, fever and rash.

That complete parallel testing of infant and mother be performed in all infants at risk of congenital syphilis, including rapid plasma reagin (RPR), infant syphilis antibodies (EIA IgM) and placental syphilis polymerase chain reaction (PCR).

That follow-up serology be conducted at 3, 6 and 12 months of age or until RPR is nonreactive to ensure treatment is effective.

That treatment of congenital syphilis be 10 days of intravenous benzylpenicillin.

Recommendation

That reducing Congenital Syphilis in Queensland requires RPR testing up to 5 times during pregnancy if at elevated risk of infection, and the monitoring of pregnant women after syphilis treatment for reinfection and partner screening/treatment with careful documentation.

Good practice point

Infants at risk of congenital syphilis require screening with:

a) RPR and Syphilis EIA IgM

b) Placental Syphilis PCR

Infants diagnosed with congenital syphilis require correct treatment with:

a) Benzyl Penicillin intravenous for 10 days

b) Follow-up serology at 3, 6 and 12 months

An audit of management of syphilis in pregnant women and their infants in 2020 made key recommendations[36] that mirror those of international studies. Improved and adherence to Queensland Clinical Guidelines[37] will assist with:

1. earlier antenatal testing and treatment: testing of pregnant women recommended up to 5 times during pregnancy depending on risk
2. improved monitoring of pregnant women after treatment
3. better documentation of partner screening and treatment
4. improved communication of maternal and infant management pathways and more frequent infant follow-up serology (seek Infectious Disease Specialist advice)

In South-East Queensland specifically, additional areas to be optimised include:

1. More comprehensive mother/infant testing at delivery
2. A stricter seven-day penicillin dosing for late latent syphilis in pregnancy
3. If maternal treatment was inadequate in pregnancy, consideration of empiric treatment of the infant with 10 days of penicillin

Perinatal and fetal autopsy consent

Perinatal autopsy should be strongly considered in all stillbirths and neonatal deaths as often new information can be added to the death certificate and information provided to parents and families. Valid consent must be obtained from parents and the provision of timely and complete clinical information to direct the examination submitted to the pathologist. Queensland has recently redrafted the Perinatal Autopsy Consent process and this now includes:

1. Perinatal consent form for non-coronial cases
2. Fetal and perinatal clinical summary form
3. Information for families

Informed Consent – Autopsy | Queensland Health
Perinatal and Fetal Autopsy Consent and Clinical Summary | Queensland Health[38]

36 Wu M, Seel M, Britton S, Dean J, Lazarou M, Safa H, Griffin P, Nourse Addressing the crisis of congenital syphilis: Key findings from evaluation of the management of syphilis in pregnancy and the newborn in South-East Queensland. Aust N Z J Obstet Gynaecol 2021; 1–7

37 Queensland Clinical Guidelines. Syphilis in pregnancy. Guideline No. MN18.44-V3-R23. Brisbane, Qld: Queensland Health, 2018

38 Perinatal and Fetal Autopsy Consent and Clinical Summary | Queensland Health

All women should have access to a continuity of care model throughout the childbirth continuum, particularly those with known risk factors.

Maternal mortality

The QMPQC is initially notified of maternal deaths by the Queensland Department of Health. This information provides the QMPQC Maternal Mortality Sub-Committee (MMSC) with the ability, in most cases, to seek detailed information about each woman's antenatal, intrapartum and postnatal care and the circumstances surrounding her death. Health professionals who had primary responsibility for the care or treatment of a woman while she was pregnant or within 365 days after the end of her pregnancy, and who are aware of the maternal death of a woman, are required by legislation[39], to provide the QMPQC with a completed maternal death reporting form[40].

Information is also sought from the State Coroner when a maternal death is subject to a coronial investigation. In-depth case review by the MMSC enables appropriate classification of each maternal death and any contributing factors to be determined. Recommendations and good practice points are then developed and data provided to the Australian Institute of Health and Welfare (AIHW) for national reporting. All maternal mortality information is deidentified where possible for the purpose of case review and reporting.

Maternal death definition

According to the World Health Organisation[41] (WHO), a maternal death is the death of a woman while pregnant or within 42 days of the end of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. This definition excludes deaths from accidental or incidental causes.

The definitions used by the QMPQC in this report include, in addition to the WHO definition, deaths from accidental, incidental deaths and deaths occurring more than 42 days after the end of pregnancy, that is, 43 days up to 365 days.

Classification of maternal deaths

Deaths in pregnancy and for the first 365 days after the end of pregnancy are uncommon and are classified in several ways.

Direct deaths are those that result from obstetric complications of the pregnant state (pregnancy, labour and puerperium), including deaths from interventions, omissions, inappropriate treatment or from a chain of events resulting from any of the above. They are complications of the pregnancy itself.

Indirect deaths are those which result from pre-existing disease or disease that developed during pregnancy and was not due to direct obstetric causes, but which may have been aggravated by physiological effects of pregnancy.

Incidental deaths are those due to conditions occurring during pregnancy, where the pregnancy is unlikely to have contributed significantly to the death, although it is sometimes possible to postulate a distant association. These deaths are not included in the calculation of the Maternal Mortality Ratio (MMR).

Late maternal death is the death of a woman later than 42 days but within one year of giving birth or otherwise ending a pregnancy. These deaths are not included in the calculation of the MMR (see next page).

Classification of maternal suicide

The WHO has reclassified maternal suicide as a direct cause of maternal death, the QMPQC has endorsed this classification noting the difficulty in ascertaining pre-existing mental health condition in some instances and the relationship between pregnancy and suicide – emphasising the significance of pregnancy and the first 12 months following as a significant psychosocial stressor.

39 Public Health Act 2005, s 228F Maternal Deaths Statistics

40 National Maternal Death Reporting Form

41 World Health Organization, Maternal Mortality Ratio (per 100,000 live births), WHO 2017

Maternal mortality ratio (MMR) Australia

The MMR is defined as $\frac{\text{Number of maternal deaths}}{\text{Number of women who gave birth}} \times 100{,}000$

In 2018 to 2019, 36 deaths occurred during pregnancy or within 365 days of the end of a pregnancy. For the purpose of calculating the MMR, the WHO definition[44] for maternal death is applied. There were seven maternal deaths (five direct deaths, one indirect death and one incidental death) which fit with this definition, giving an MMR of 5.0 per 100,000 births which is slightly lower than the national rate of 5.7 percent per 100,000 births for the same period. (Note – this is not due to obstetric causes, but other causes such as worsening perinatal mental health and pregnancies complicated by various malignancies). There were 29 late maternal deaths for this period. These were classified as 14 direct deaths, 10 incidental deaths and five indirect deaths.

The MMR in Queensland in the most recent four triennia are shown in Table 10 and have been explained in more detail in previous QMPQC reports[42].

Classification of cause of maternal deaths

In this section, the broader definition of maternal death is used, including incidental and late maternal deaths.

Table 11 shows the classification of the 36 deaths that occurred during pregnancy or within 365 days of the end of a pregnancy in the period 2018 to 2019. Nineteen deaths were a direct result of the pregnancy and six indirect deaths (resulting from a pre-existing condition aggravated by the physiological effects of pregnancy) were reported. Eleven women died of incidental causes.

Table 10: Maternal mortality ratios (MMR), Queensland and Australia, 2008–10 to 2017–19

Triennia	Direct	Indirect	Number of women who gave birth in Queensland	MMR Queensland	MMR Australia[43]
2008–2010	6	9	182,375	8.2	6.0
2011–2013	8	4	185,975	6.5	7.3
2014–2016	7	5	185,629	6.5	6.8
2017–2019	6	7	178,602	7.3	5.6^

Includes direct and indirect deaths within 42 days of the end of pregnancy.

^ Excludes data from Western Australia for 2019.

Table 11: Classification of maternal deaths in Queensland 2018–2019 (includes incidental and late deaths)

Maternal death timing	Classification	Total
Deaths during pregnancy	Direct	2
	Incidental	1
Deaths within 42 days of end of pregnancy	Direct	3
	Indirect	1
Deaths between 43 days and 365 days of end of pregnancy (i.e. late maternal deaths)	Direct	14
	Indirect	5
	Incidental	10
	Total	36

Includes all maternal deaths.

42 Previous QMPQC reports Clinical Excellence Queensland

43 Australian Institute of Health and Welfare (AIHW) 2021, Maternal deaths, viewed 11 May 2022

Cause of maternal death

Table 12 shows the cause of the 36 deaths that occurred during pregnancy or within 365 days of the end of a pregnancy. Suicide (12), cardiac complications (6) and Malignancy (4), were the most prominent causes of death during 2018–2019. As the numbers are small on a population basis, care should be taken with interpretation.

Table 12: Cause of maternal deaths in Queensland 2018–2019

	During pregnancy/ 0–42 days postpartum	43–365 days postpartum
Cause of death	Number	Number
Total deaths	7	29
Direct		
Suicide	1	11
Cardiac		2
Cardiomyopathy		2
Substance use disorder	1	
Thromboembolic disease	2	1
Primary postpartum haemorrhage	1	
All direct deaths	5	14
Indirect		
Cardiac		3
Cardiomyopathy		1
Cor pulmonale		1
Myocarditis		1
Malignancy		1
Metastatic uterine cancer		1
Substance use disorder	1	1
All indirect deaths	1	5
Incidental		
Malignancy		3
Metastatic gastric adenocarcinoma		1
Epiglottic sarcoma		1
Multiple myeloma		1
Cardiac		1
Coronary atherosclerosis		1
Head, neck and trunk trauma	1	
Motor vehicle trauma		3
Intra-cerebral haemorrhage		1
Septicaemia		1
Adult Stills disease/Hyperammonaemia		1
All incidental deaths	1	10

Includes all maternal deaths.

Perinatal mental health

Postpartum suicide

Suicide remains the most common cause of maternal mortality. It is distressing to review the deaths of mothers due to suicide, who had infants of less than 12 months of age. Women continue to fall through the gaps of mental health care provision, including appropriate identification of their mental health needs during pregnancy and in the first postpartum year. This is a public health issue which is of concern to the MMSC and requires considered attention.

There were 12 deaths in 2018–2019 due to suicide.

Screening assessment and referral pathways

We must ensure that all health workers involved with pregnant women and mothers, are appropriately skilled in initial mental health assessment. Perinatal mental health disorders are common, and specialist perinatal mental health services are often poorly resourced. Addressing the gaps in provision of adequate services must be prioritised. Focusing on timely access to specialist perinatal mental health services and/or advice is a matter of serious concern. While psychosocial screening and screening for depression in pregnancy with the Edinburgh Depression Scale is now common, those who screen must be appropriately skilled in this screening process. In particular, the assessment of women who identify with thoughts of self harm and/or suicide, must have local referral pathways instigated, as this cohort are at risk of acute mental health issues in the peripartum period.

Significant associations

The majority of women who died by suicide faced significant psychosocial adversity, including low levels of social support, homelessness, domestic violence, comorbid mental health difficulties, often long standing and associated substance use disorders and were often subject to child protection concerns. Frequently, these women had histories of multiple adversities over their lifetime, including complex trauma and high burden of adverse childhood experiences.

Poor engagement

Engaging women with appropriate mental health care remains difficult. While there appears to have been an improvement in mental health and psychosocial screening in pregnancy, there is a lack of co-ordination of care for some women. In some cases reviewed, there was failure to recognise a history of difficulties faced in previous pregnancies. Women with multiple psychosocial adversities, mental health and comorbid substance use issues are extremely difficult to engage. An over representation of deaths by suicide in regional areas may reflect the lack of expertise in perinatal mental health of adult mental health services when assessing and managing women who present with suicidal ideation and behaviour.

Suicide after termination of pregnancy

There were two suicides following termination of pregnancy. The Queensland Clinical Guidelines on Termination of Pregnancy[44] notes the importance of psychosocial assessment and referral as required for women seeking termination of pregnancy. While adverse psychological sequela may be no more likely following a termination of pregnancy than following the continuation of pregnancy, noted risk factors for adverse psychological sequela include previous or current mental illness, coercive domestic violence, ambivalence about the pregnancy, increased length of gestation, lack of social support, poor relationships with others and cultural and religious beliefs. Recognising these risk factors will allow for appropriate referrals to be made for mental health support.

Suicide calls to emergency services

The Partners in Prevention data linkage project[45] studied a dataset of individuals who were the subject of a suicide related call to Queensland Ambulance or police between 2014 and 2017. Five percent of this dataset were pregnant women or women who had recently given birth. A sub-cohort of women in this study who were between six months preconception and two years postpartum, were more likely to be younger, Aboriginal and/or Torres Strait Islander, and to live outside a major city compared to women who had suicide related contacts outside this timeframe. There was a high rate of out of hours calls to police and ambulance and low rates of emergency department admission or mental health follow-up.
This research highlights the significant unmet need for this population. It has implications for development of health pathways inclusive of perinatal mental health and non-clinical crisis support services that are culturally responsive and meet the needs of Aboriginal and Torres Strait Islander women. Further research is being undertaken on this perinatal dataset to determine the association between suicidality and maternal death by suicide[46].

Assessment of suicide risk

At the time of some maternal deaths, women had been in contact with mental health services with suicidal ideation and/or behaviour. There is a need to understand the unique risk factors for suicide in women in the peripartum period. These comprise comorbid mental health problems including but not limited to, depression, complex trauma personality disorders, post-traumatic stress disorder (PTSD), alcohol and substance use disorders and psychosocial adversity which interact with the stress of parenting. There is a risk that mental health assessments done cross-sectionally at a time of crisis presentation may underestimate the impact of long-term stressors. Suicide risk assessments in women in the peripartum should be informed by knowledge of unique risk factors and warning signs associated with this patient population including an awareness of symptoms and signs of postpartum psychosis, and the increased risk of suicidality in those mothers who are currently, or who have a history of involvement with Child Protection Services.

44 Queensland Clinical Guidelines. Termination of Pregnancy. Guideline No MN19.21-V5-R25. Queensland Health 2020

45 Partners in Prevention: Understanding and Enhancing First Responses to Suicide Crisis Situations

46 Meurk, C et al; Suicide crisis calls to emergency services: Cohort profile and findings from a data linkage study in Queensland, Australia; Aust N Z J Psychiatry. 2022 Feb;56(2):144-153

Recommendation

Develop a Queensland clinical guideline on perinatal mental health.

That an urgent review be undertaken of perinatal mental health services, to ensure adequate resourcing and access, to identify current gaps.

That education around suicide safety planning and accessing acute mental health care be available to all health professionals and agencies who see women in the peripartum.

Good practice point

Improvements of understanding suicide prevention pathways including Safety planning and consideration of access to means and understanding of unique stressors in pregnant and postpartum women particularly those women currently involved with or who have a history of involvement with Child protection services.

All health professionals working with pregnant and postpartum women need to be skilled in psychosocial and mental health assessment. Adoption of Queensland Health Guidelines on Suicide Prevention Practice needs to be widespread throughout Queensland and adopted by all services responding to suicidal crises.

When considering suicide risk, clinicians should be aware of the population groups more vulnerable to peripartum mental illness and should consider all available suicide prevention strategies.

The Queensland Health Guideline on Suicide Prevention Practice[47] was released in December 2021. The guideline provides guidance based on current evidence for identifying and responding to the needs of people at risk of suicide presenting to Mental Health and Alcohol and other Drugs services (MHAOD). This guide is complemented by training in suicide risk assessment and management provided by the Queensland Centre for Mental Health Learning. The guidelines recommend suicide safety planning intervention, a collaborative process between staff, the consumer and their family and friends assisting the consumer to identify how they can manage their suicidal thoughts while also reducing access to lethal means. Restricting access to lethal means is a proven way of influencing outcomes in individuals experiencing suicidal ideation[48].

Awareness of suicide risk by agencies involved with vulnerable families

One of the women who died by suicide had been in contact with police and child protection services with a background of domestic violence concerns. It is important that these agencies are aware of the heightened vulnerability for mental health deterioration and suicide risk for these women during and after pregnancy. Improved collaboration between all services supporting women facing psychosocial adversities including poverty, domestic violence and unstable housing is important. Women need prompt access to perinatal mental health services. More resources are required to fund perinatal mental health services to support and educate these agencies and women in the peripartum period.

Comorbid alcohol and substance misuse

Alcohol and substance use were noted in nine maternal deaths. Women with substance misuse are often more vulnerable and at greater risk of relapse in the postpartum period, particularly in the setting of psychosocial adversities including comorbid mental health issues, domestic violence and low levels of social support. The Queensland Clinical Guidelines Perinatal Substance Misuse: Maternal[49] – outlines the importance of multidisciplinary assessments, mental health care referrals and the importance of postnatal surveillance of maternal mental health and multidisciplinary approach to facilitate post discharge care including referrals to Family and Child Connect and family support services[50].

Suicide in Aboriginal and Torres Strait Islander women

Two of the women who died by suicide were Aboriginal and Torres Strait Islander women. Acknowledgement of exposure to intergenerational trauma and the psychosocial adversities faced by these women and their families is required. Consideration must be given to culturally and trauma informed practices in maternity care, mental health services and other services including child protection services, with the aim to prevent further suicides. Facilitating access to relevant services such as Aboriginal and Torres Strait Islander health workers is important.

47 Queensland Health Guideline Suicide Prevention Practice. Guideline No QH-GDL-967:2021

48 Turner, K et al; Implementing a systems approach to suicide prevention in a mental health service using the Zero Suicide Framework; Aust N Z J Psychiatry. 2021 Mar;55(3):241-253

49 Queensland Clinical Guidelines. Perinatal Substance Misuse: neonatal. Guideline No MN21.37-V2-R26

50 Knight M, Bunch K, Tuffnell D, Jayakody H, Shakespeare J, Kotnis R, Kenyon S, Kurinczuk JJ (Eds.) on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care – Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2014-16. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2018

Mental health follow-up

Antenatal and postnatal screening has led to better identification of women at risk of mental health disorders during pregnancy. However, the challenge lies in managing new and ongoing mental health and psychosocial difficulties beyond the first six weeks postpartum.

Women who have pre-existing mental health disorders or are diagnosed during pregnancy need careful postpartum follow-up. There continues to be a gap in care between maternity providers, child health nurses, mental health providers and general practitioners. A clear discharge plan for mental health follow-up needs to be provided by hospital maternity care providers. Midwives and child health nurses involved in postpartum care need to ensure appropriate mental health care follow-up occurs. Communication between maternity care providers, mental health care providers, general practitioners and family support services must be a priority.

There are many resources available for both women and clinicians, designed to reduce the impacts of emotional and mental health problems in the antenatal and postpartum period. These should be accessed to support follow-up management of new and ongoing mental health or psychosocial difficulties[51, 52, 53]. Women with a history of complex trauma and personality vulnerabilities often struggle with multiple psychosocial adversities which can lead to barriers to accessing care. Co-ordination of services across mental health, general practice, child health and family support services to encourage ongoing engagement and not just in times of crisis is important.

Trauma informed care

In some cases, missed antenatal appointments contributed to maternal deaths. This was contributed to by the history of complex trauma in some women. Women with a history of complex trauma are often less able to engage in high quality care. Complex trauma has a range of consequences including lower levels of education, reduced capacity for self-care, higher rates of substance use as a soothing behaviour, higher rates of poverty, higher rates of ongoing experiences of domestic violence, triggers that may make accessing medical care difficult and higher rates of mental illness.

Women who have PTSD due to complex trauma, previous birthing experiences, or for any other reason need great care taken, to ensure that health care is not triggering. This can lead to dis-engagement and even avoidance of continuing maternity care, and the potential for that inadequate care leading to either harm or poor health outcomes. There is an urgent need for maternity health care providers to be educated about trauma informed care, and the role complex trauma has in women being able to engage in care[54].

Recommendation

That comprehensive perinatal mental health services across the continuum of ambulatory care, consultation, liaison and local inpatient beds be implemented state-wide.

Good practice point

Women who have pre-existing mental health disorders or are diagnosed during pregnancy require a clear discharge plan provided by hospital maternity care providers, for mental health follow-up.

Transparent communication between all health care providers involved in the woman's care must be a priority and led by the primary maternity care provider.

Recommendation

That all maternity care providers receive education about complex trauma, and the principles of trauma informed care.

Good practice point

Women with a history of complex trauma benefit from sensitive trauma informed care with support from multidisciplinary services through collaboration with maternity services, alcohol and other drugs services, mental health services, domestic violence services; continuity of midwifery care; general practice and other services as required.

51 Australian Institute of Health and Welfare. Resources for supporting psychosocial health in pregnancy – Mental health

52 Queensland Centre for Perinatal and Infant Mental Health

53 Centre of Perinatal Excellence (COPE)

54 Blue Knot: resources for supporting patients effected by trauma

Good practice point

Delivery of a woman identified at high risk of having a complicated delivery (for example massive obstetric haemorrhage) should be planned, where possible, to occur as an elective delivery in normal hours. This planning should be managed at the consultant level. High level consultant care needs to continue in the immediate post-operative and postpartum phase when the risk of haemorrhage is high.

Recommendation

That a dedicated mothers page be added to the Personal Health Record Child Health Information (PHR CHI) booklets documenting conditions or diseases incurred during pregnancy, highlighting the need for monitoring and follow-up alongside neonatal monitoring.

Good practice point

The postpartum period is a significant risk time for VTE and adequate prophylaxis needs to be considered in all women. Women presenting postpartum with respiratory symptoms or other clinical features that suggest a pulmonary embolism (PE) postpartum should be adequately investigated for VTE. Venous ultrasound or imaging to exclude DVT, and investigation into a PE (CTPA/VQ scan) should be performed if there is any clinical concern, including in breastfeeding women.

Obstetric haemorrhage

One woman died from a primary postpartum haemorrhage. This continues to be a leading cause of maternal morbidity and mortality in Australia and worldwide.

The Queensland Clinical Guideline' Primary Postpartum Haemorrhage[55] details management of postpartum haemorrhage including the initial response to postpartum haemorrhage and the massive haemorrhage protocol.

All women need to be assessed as to their risk of postpartum haemorrhage antenatally and an appropriate, agreed management plan documented. All women, but especially high-risk women, need to be continually reviewed in the immediate postpartum period and this involves regular observations of vital signs, assessment of vaginal blood loss, assessment of fundal height to detect non revealed bleeding, which can result in an underestimation of blood loss, and early escalation of care if blood loss continues.

Postpartum events

Thyroid disease

For this report, a case of a woman was reviewed where undiagnosed postpartum thyroid disease may have contributed to deterioration of other medical issues. Thyroid disease first identified or requiring treatment during pregnancy can have a variable post-partum course. Careful post-partum surveillance of thyroid disease is required, with vigilance around the risks of postpartum thyroiditis, postpartum hyperthyroidism and postpartum hypothyroidism.

Venous Thromboembolism (VTE)

Failure to observe clinical guidelines around postpartum thromboprophylaxis contributed to one maternal death in this report. The Queensland Clinical Guidelines regarding postpartum thromboprophylaxis should be followed, particularly for women who have risk factors such as operative deliveries, higher BMIs, smoking, pre-existing or gestational diabetes, hypertension, sepsis, and other co-morbidities.

Gestational diabetes and hypertension

In some cases, women had not had appropriate follow-up after pregnancy related hypertension and gestational diabetes, resulting in poor outcomes in subsequent pregnancies. Health care providers across the hospital sector and general practice need to provide clear clinical handover, and every effort needs to be made to ensure women have appropriate follow-up of diabetes and hypertension, prior to subsequent pregnancies, and also over the longer term to promote cardiovascular health in women.

55 Queensland Clinical Guidelines Primary postpartum haemorrhage: maternal Guideline No MN21.37-V2-R26 Queensland Health 2021

Condition and postnatal plan at discharge

Poor postnatal care and handover was a factor identified as contributing to maternal death. Formal clinical handover to primary and community care is essential. All women need to be discharged with an agreed written postnatal care plan, which must be communicated in a timely way to the woman's primary carer.

Elements of the plan should include:

- For women
  - Information about what to expect in the first 6 weeks postpartum
  - Baby's Personal Health Record (Red book)[56]
  - Child Health information: Your Guide to the first 12 months[57]
  - When and how to seek care in the event of concerns
- For Midwives
  - Relevant clinical information pertaining to the pregnancy, labour and immediate postnatal period including:
    - Mode of delivery and with associated delivery outcomes including:
      - Perineal status
      - Estimate blood loss with pathology results
    - Domestic and family violence/mental health concerns
    - Neonatal condition including:
      - Feeding status
    - Neonatal outcomes including:
      - Apgars/resuscitation
      - Neonatal Complications such as jaundice
- For GPs
  - Recommendations for routine five and seven day, and a six week Mother and Baby checks including cervical screening, contraception, perinatal mental health, immunisation, infant feeding
  - Identified pregnancy, birth or postnatal complications and recommended follow-up (e.g. anaemia, GDM, thyroid disease, hypertension, VTE, OASIS)
  - Consultation and referral pathways if required.

Postnatal appointments should be of sufficient duration to meet the needs of women and babies in the puerperium, recognising the challenges that can be posed by adapting to the demands of a new infant while recovering from birth.

GPs providing puerperal care should have regular continuing professional development to ensure their practice is contemporary and evidence based.

Recommendation

That all women should leave hospital with an agreed postnatal care plan which includes details of the practitioner, medical practice or community centre providing follow-up care, significant issues requiring follow-up, and a contraceptive plan.

Women who require medical or psychological follow-up should be given appropriate referrals at time of discharge.

Recommendation

That women should be provided with information on what to expect in the first 6 weeks postpartum in addition to the Baby's Personal Health Record (red book) and Child Health Information Guide to the first 12 months.

Good practice point

A decision to discharge a woman earlier than recommended should prompt review by Senior Medical Staff and the Multidisciplinary Team.

Postnatal care should be woman and family centred, recognising the challenges of caring for a newborn while recovering from birth.

Following a pregnancy complicated by hypertensive disorders of pregnancy, women have an increased risk in future pregnancies of gestational hypertension and pre-eclampsia as well as an increased risk of longer-term cardiovascular disease. These women should have annual cardiovascular risk factor assessment including BP, serum lipids and blood glucose level.

Women with gestational diabetes mellitus require lifelong screening for the development of Type 2 diabetes and cardiovascular disease. If planning future pregnancies, annual OGTT or HbA1c is recommended and if no further pregnancies are planned, diabetes screening is recommended every three years.

56 Personal health record (red book) information for Parents and Families

57 Your guide to the first 12 months

Recommendation

That maternity units delivering more than 3000 babies a year should have an obstetric medicine service on site.

That hospitals providing care with less than 3000 births per year should have strong links with an obstetric medicine department at their referring hospital.

Multidisciplinary care and services

There are many contributors to increasing complexity in caring for pregnant women. Medical complexity is driven by increasing age, increasing BMI, fertility therapies, survival of childhood illness with preserved reproductive capacity, and better treatment of complex and chronic illness. Our review of cases identified that a lack of appropriate physician input into the care of medically complex women contributed to maternal deaths. We strongly recommend that large obstetric services have an appropriately staffed obstetric medicine service, given the demographic changes of pregnant women.

Safe care demands that each woman receives the right care in the right place at the right time. Numbers of women with complex needs conceive each year and may have their pregnancy complicated by previous medical problems, such as cardiac, endocrine, renal, haematological, malignancy. An appropriately skilled multi-disciplinary team (MDT) is required for these women.

With the expansion of obstetric medicine as a sub-specialty, these practitioners have a critical role in providing care for complex medical problems in pregnancy and have a key role in the organisation and co-ordination of the MDT. Not all medical specialists, especially in regional areas, are comfortable with managing medical problems in pregnancy, which can lead to delays in care or incorrect care.

Some women featured in this report died because their care was delayed, fragmented, late or inappropriate. In women with complex medical needs, delays in care, and having fragmented care pose even higher risks. Given that these women are usually cared for in a tertiary hospital setting, it is important that such hospitals are appropriately resourced to provide such care.

To avoid fragmentation of care for women with complex medical needs in pregnancy and to provide support for Obstetric consultants in managing pregnant women during complex pregnancy, it is recommended that any maternity service providing more than 3000 births per annum should have an Obstetric Medicine department. Those hospitals providing care for less than 3000 births per year should have strong links with an Obstetric Medicine department at their referring hospital, and engage in MDT meetings about their complex patients, to ensure a comprehensive agreed care plan is in place for these women antenatally.

Investigations of pre-existing conditions in pregnancy

Lack of appropriate investigations and management of complex and chronic medical conditions remains a contributor to adverse events. Experienced physicians with expertise in pregnancy care need to be involved in complex decision making. In general, there are very few investigations that should be delayed until after pregnancy. If a decision is being made to delay investigation until after pregnancy, this should be only made by highly experienced clinicians, ideally with multi-disciplinary team review and input

Women who are planning a pregnancy and have medical problems need access to appropriately trained health professionals (e.g. GP, Obstetrician, Obstetric Medicine Physician, Geneticist), who can provide suitable pre-conception advice.

If a woman is pregnant and undergoing investigations for pre-existing medical conditions, practitioners providing care must be alert to the various physiological changes wrought by pregnancy on a woman, and to interpret the results of any tests accordingly, to avoid mis-interpretation and over-investigation.

Shared antenatal care

Many women have shared antenatal care provided by their Primary Maternity Carer (e.g. GP or Midwife) and the birthing facility health care professionals. Currently, the recommended mechanism for facilitating continuity of care and information exchange (clinical handover) is the Pregnancy Health Record (PHR).

Many sites in Queensland now have an integrated electronic Medical Record (ieMR). If electronic records are used, there is currently no easy way to ensure timely and accurate information sharing and maintenance of continuity of care between community and birthing facility health care professionals. This is a significant safety risk and may cause unnecessary duplication of care. Attention needs to be given by eHealth Queensland to find a satisfactory solution to this problem, in the interests of women and their safe pregnancy care.

Recommendation

In sites using electronic medical records, an electronic solution needs to be developed that allows for timely data sharing between hospital providers, GPs, midwives and women.

Malignancy in pregnancy

In each of the Maternal Mortality reports in Queensland in the past six years, there have been cases of women who have died after a late diagnosis of malignancy during pregnancy. The symptoms and signs of pregnancy can overlap with those of malignancy, for example, nausea and vomiting, abdominal distension, breast changes, alterations in bowel habit, increasing pigmentation of skin lesions and so on. It is important that any practitioner providing antenatal care does not ignore persisting symptoms and postpone relevant and indicated investigations because of pregnancy. Few malignancies will become more aggressive during pregnancy, but it is vital that if a practitioner would normally investigate a symptom or sign, for example, bleeding per rectum, if the woman was not pregnant, that they do so during pregnancy to avoid a delayed diagnosis of malignancy.

Good practice point

Investigation of iron deficiency, weight loss out of proportion to expected changes in pregnancy and other suspicious symptoms and signs need to be investigated appropriately and not delayed because of pregnancy or breastfeeding.

Autopsies following maternal death

The Maternal Mortality Sub-Committee reiterates the comment included in the QMPQC 2017 Report[58] regarding the importance of establishing an accurate diagnosis in cases of unexpected and/or sudden death, in women who are pregnant or in the first 12 months postpartum. An autopsy is strongly recommended in cases where a cause of death is unclear. A molecular autopsy is required if a cause of death is not identified through conventional autopsy. Additionally, clinicians need to be aware of referral pathways for first degree relatives of the deceased for clinical family screening and where appropriate, genetic testing of unexplained sudden cardiac death. The aim of these further steps is to identify causes of sudden unexplained cardiac death, most importantly inherited arrhythmias, in which there may be life-saving treatments available for other affected family members. This information needs to be provided to families for the purpose of informed decision-making about their own health. In a recent study led by Australian and New Zealand investigators, genetic testing revealed a likely cause of death in 27 percent of otherwise unexplained sudden cardiac deaths in the young (aged <35 years), and relevant clinical diagnoses in 13 percent of families referred for screening[59]. Genetics Health Queensland offers a Statewide Cardiac Genetics Service based at the Royal Brisbane and Women's Hospital (adults) and Queensland Children's Hospital (children). Regional clinics and telehealth appointments are also available. The service offers family screening, genetic counselling and where appropriate genetic testing.

Recommendation

That an autopsy, and where appropriate and available, molecular investigations, be performed in all cases of maternal mortality. Consideration should be given to amending the Queensland Coroners Act 2003 to include investigation of all maternal deaths (including late deaths), except where there is a clear and unequivocally diagnosed cause of death, for example, a known metastatic malignancy.

Good practice point

It is important to emphasise that unexpected and/or sudden death in women of childbearing age has a broad differential diagnosis which should be considered in all cases. Clinical diagnosis does not override the importance of autopsy.

58 Report of the Queensland Maternal and Perinatal Quality Council 2017. Page 42

59 Bagnall RD et al A Prospective Study of Sudden Cardiac Death among Children and Young Adults: N Engl J Med 2016;374:2441-52

Recommendation

That a systematic approach to reporting and reducing workplace intimidation, bullying, harassment and poor culture be developed for state-wide implementation within all Queensland hospitals.

Psychologically safe workplace environments

It is critical that workplace culture is clearly recognised as a risk factor for adverse patient outcomes. Patient safety and quality of care is dependent upon a psychologically safe working environment, free of intimidation, harassment or bullying. A respectful, caring team environment is necessary for the delivery of world class healthcare. Maternity environments are high stress, making workplace culture particularly pertinent not only for health care providers, but also for patients and their families, who are very likely to witness and/or be impacted by workplace culture.

We note that the recommendations from our previous report around this matter have not progressed and urge that every effort is made to address these issues.

Avoidability

Maternal mortality case review findings are classified against the AIHW required option (see Appendix E, page 81).

Table 13 shows over 32 percent of women who died during 2004 to 2019 had contributing factors identified.

Characteristics of women who died in the period 2004–2019

Aboriginal and Torres Strait Islander women comprised 15.6 percent of maternal deaths from 2014 to 2019, but just 6.8 percent of all births in Queensland over the same epoch. Similar results are seen from 2008 to 2013 (Table 14). This indicates an ongoing elevated rate of Aboriginal and Torres Strait Islander maternal deaths. There is still a long way to go in closing the gap for Aboriginal and Torres Strait Islander women. The QMPQC encourages clinicians to continue to advocate for system changes and to continue to work collaboratively to improve these outcomes.

Table 13: Clinical characteristics of direct and indirect maternal deaths, Queensland 2004–2019 (death during pregnancy or within 42 days of giving birth)

Characteristic		2004–2019	%
Death classification	Direct	40	50.6
	Indirect	38	48.1
	Classification uncertain	1	1.3
Timing of death	Death occurred after a termination of pregnancy	8	10.1
	Death occurred after miscarriage	3	3.8
	Death occurred after the woman gave birth	48	60.8
	Death occurred in trimester 1 of pregnancy	7	8.9
	Death occurred in trimester 2 of pregnancy	6	7.6
	Death occurred in trimester 3 of pregnancy	7	8.9
Autopsy	Autopsy performed	62	78.5
	Autopsy not performed	17	21.5
Avoidability	No avoidable factors	46	63.0
	Possibly avoidable	21	28.8
	Avoidable	3	4.1
	Avoidability uncertain	2	2.7
	Avoidable factors yet to be determined	1	1.4

Includes direct and indirect deaths within 42 days of the end of pregnancy.

Table 14: Characteristics of women who died (direct and indirect deaths), and percentages of all women giving birth, Queensland, 2008–2019

	2008–2013				2014–2019			
	Maternal deaths		Queensland		Maternal deaths		Queensland	
	n	%	n	%	n	%	n	%
Aboriginal and Torres Strait Islander	4	10.0	21,449	5.8	10	15.6	24,791	6.8
Non-Aboriginal and Torres Strait Islander	36	90.0	346,901	94.2	54	84.4	339,440	93.2
First time mother	5	18.5	150,433	40.8	9	18.8	149,499	41.0
One/more previous birth	22	81.5	217,916	59.2	39	81.3	214,730	59.0
Less than 20 years	5	12.5	19,366	5.3	2	3.1	12,705	3.5
20–34 years	25	62.5	276,500	75.1	44	68.8	277,401	76.2
35+ years	10	25.0	72,484	19.7	18	28.1	74,125	20.4
Underweight	0	0.0	17,936	5.0	5	11.9	19,749	5.5
Normal	11	45.8	181,231	50.6	16	38.1	182,279	50.8
Overweight	7	29.2	87,854	24.5	8	19.0	83,633	23.3
Obese	6	25.0	71,345	19.9	13	31.0	73,426	20.4
Major cities	19	47.5	220,533	60.5	41	65.1	229,518	63.6
Inner regional	15	37.5	73,684	20.2	15	23.8	67,389	18.7
Outer regional	4	10.0	58,989	16.2	6	9.5	53,538	14.8
Remote/very remote	2	5.0	11,599	3.2	1	1.6	10,206	2.8

Includes all direct and indirect deaths.

Percentages are calculated as proportion of women with available data for that characteristic. Totals for each characteristic vary depending on data completeness. BMI only available from July 2007.

Reporting of maternal deaths

Since the amendment in 2013 to the Queensland Public Health Act 2005 (the Act), which mandates the reporting of maternal deaths by public and private health professionals, there has been vast improvement in the QMPQC's capacity to review and appropriately classify maternal deaths. This demonstrates the value of pursuing the appropriate legislative amendment. Specifically, Division 3, Section 228F and 228G of the Act outlines who is responsible for providing the notification about a maternal death and in what format. The National Maternal Death Report Form[60] is the designated format for the reporting of all maternal deaths that occur in Queensland.

Good practice point

All health professionals who had primary responsibility for the care or treatment of a woman while she was pregnant or within 365 days after the end of her pregnancy, and who are aware of the maternal death of a woman, are required by legislation[61] to provide the QMPQC with a maternal death reporting form completed with as much information as possible.

60 National Maternal Death Report

61 Public Health Act 2005, s 228F

Perinatal mortality

Definitions

Fetal death (stillbirth): defined by the Queensland Public Health Act 2005 as a baby who has shown no sign of respiration or heartbeat, or other sign of life after completely leaving the child's mother and who has been gestated for 20 weeks or more, or weighs 400g or more.

Live birth: defined by the Act as a 'baby whose heart has beaten after delivery of the baby is completed'.

Perinatal mortality: defined in this report as all fetal deaths (stillbirths) of at least 20 weeks gestation or at least 400 grams birthweight and neonatal deaths (deaths of live-born babies of any weight or gestation within the first 28 days of life).
In 2018 and 2019 the perinatal mortality rate in Queensland was 9.8 per 1000 births. This included:

- 826 stillbirths (6.8 per 1000 births)
- 361 neonatal deaths (3.0 per 1000 live births)
- The national perinatal mortality rate for the same period was 9.5 per 1,000 births (stillbirth rate 7.1 per 1,000 births and neonatal mortality rate 2.4 per 1,000 live births)[8, 62].
  The perinatal mortality rate in Queensland is slightly higher to the national rate, with the stillbirth rate being slightly lower and the neonatal death rate being higher.
- The rate of stillbirths has not changed significantly in Queensland over the decade 2010 to 2019 (annual percentage change: 0.3; 95 percent CI: –0.8, 1.3) while neonatal death rate has declined modestly (annual percentage change: –1.8; 95 percent CI: –3.3, –0.2). When data are stratified by gestational age however, stillbirth and neonatal death rates among babies born at later gestational ages have declined[63].
- Higher perinatal mortality rates occur in hospitals where women with higher risk pregnancies give birth. Table 15 shows that the highest rates occur in hospitals where the rate of preterm birth and other associated risk factors is highest. While these risk factors and medical conditions in the mother and/or baby account for a large proportion of deaths, quality of care can also be a factor (see Contributing factors, page 57).
- The data in Table 15 must be carefully interpreted as no adjustments are made for the different populations using hospitals of different levels. For example, almost all of the excess in perinatal deaths in Level 6 hospitals can be accounted for by the higher neonatal death rate. This is directly related to their role in caring for babies who are born extremely preterm due to the neonatal intensive care facilities located in Level 6 hospitals.

62 Australia's mothers and babies: Stillbirths and neonatal deaths

63 Gregory K, Utz M, Johnston T. Trends in stillbirths and neonatal deaths among babies born to Indigenous and non-Indigenous women in Queensland, 1988-1992 to 2013-2017. Statbite#81. Statistical Services Branch, Queensland Health. 2020

Table 15: Rate of perinatal mortality and selected perinatal/maternal risk factors, excluding terminations of pregnancy and babies with selected major congenital anomalies, by hospital peer group, 2018–2019

Peer group	Stillbirth rate (a)	Neonatal death rate (b)	Perinatal death rate (a)	Preterm rate (c)	LBW (d)	% <5 Antenatal visits (e)	% Smoking after 20 weeks (f)	% Obese (g)
Level 2/3	3.6	1.0	4.6	4.2	2.9	4.7	17.8	22.3
Level 4/5	3.8	1.4	5.2	8.3	6.4	4.3	14.8	28.6
Level 6	4.4	3.4	7.7	10.3	8.7	4.9	6.6	18.1
Private	2.7	1.3	4.0	8.8	5.5	1.0	0.3	15.5
Total (h)	3.8	2.0	5.8	8.7	6.6	3.9	9.2	21.8

Peer group determined based on Clinical Services Capability Framework. For further detail, see https://www.health.Queensland.gov.au/__data/assets/pdf_file/0024/444273/cscf-maternity.pdf

Birthing centres categorised as peer group of parent facility.

(a) Rate per 1000 births.

(b) Rate per 1000 livebirths; mortality within 28 days of birth.

(c) Rate of babies born prior to 37 weeks gestation per 100 births. Excludes records of unknown gestation.

(d) Low birthweight (lbw). Rate of babies <2500g per 100 livebirths. Excludes records of unknown birthweight.

(e) Rate per 100 births. Excludes babies born to mothers with unknown number of antenatal visits and births at less than 32 weeks gestation.

(f) Rate per 100 births. Excludes babies born to mothers of unknown smoking status after 20 weeks.

(g) Rate per 100 births. Excludes babies born to mothers of unknown BMI.

(h) Includes babies born at level 1 facilities, born before arrival, home birthed and born at not stated facility.

Deaths of Aboriginal and Torres Strait Islander babies

In Queensland and nationally, stillbirths and neonatal deaths occur at a higher rate among babies born to Aboriginal and Torres Strait Islander women than among babies born to non-Aboriginal and Torres Strait Islander women. In Queensland in 2018 and 2019 stillbirths occurred at 1.6 times the rate and neonatal deaths occur at 1.8 times the rate. There has been little change in this figure over the past decade.

When death rates were explored within gestational age categories, a significant disparity in term stillbirths was found between babies born to Aboriginal and Torres Strait Islander women and babies born to non-Aboriginal and Torres Strait Islander women. The disparity has been attributed to higher rates of maternal diabetes, perinatal infection, fetal growth restriction and unexplained antepartum fetal death in Aboriginal and Torres Strait Islander women[64].

The neonatal death rate was also higher among babies of Aboriginal and Torres Strait Islander women who were born at term, though the difference was not significant in the most recent period examined[71]. The stillbirth and neonatal mortality rates for babies born at earlier gestations were not higher in babies born to Aboriginal and Torres Strait Islander women, but there has been little change in the proportion of babies born preterm. The overall excess in neonatal mortality for babies of Aboriginal and Torres Strait Islander women is unlikely to reduce until the excess in preterm births is addressed[71].

The Queensland Government provided funding of $3.0 million over the 2016–2018 period, through the Making Tracks towards closing the gap in health outcomes for Aboriginal and Torres Strait Islander Queenslanders by 2033: Investment Strategy 2015–2018. The Institute for Urban Indigenous Health was tasked with the expansion of the Birthing in Our Communities workforce, increasing the number of midwives and Aboriginal and Torres Strait Islander worker positions; and the establishment of Birthing in Our Communities program through the Mums and Bubs Hub based in Salisbury, Brisbane, which opened in October 2016.

64 Ibiebele I, Coory M, Boyle F, Humphrey M, Vlack S, Flenady V. Stillbirth rates among indigenous and nonindigenous women in Queensland, Australia: is the gap closing? BJOG 2014; DOI: 10.1111/14 DOI: 10.1111/14 DOI: 10.1111/1471-0528.13047

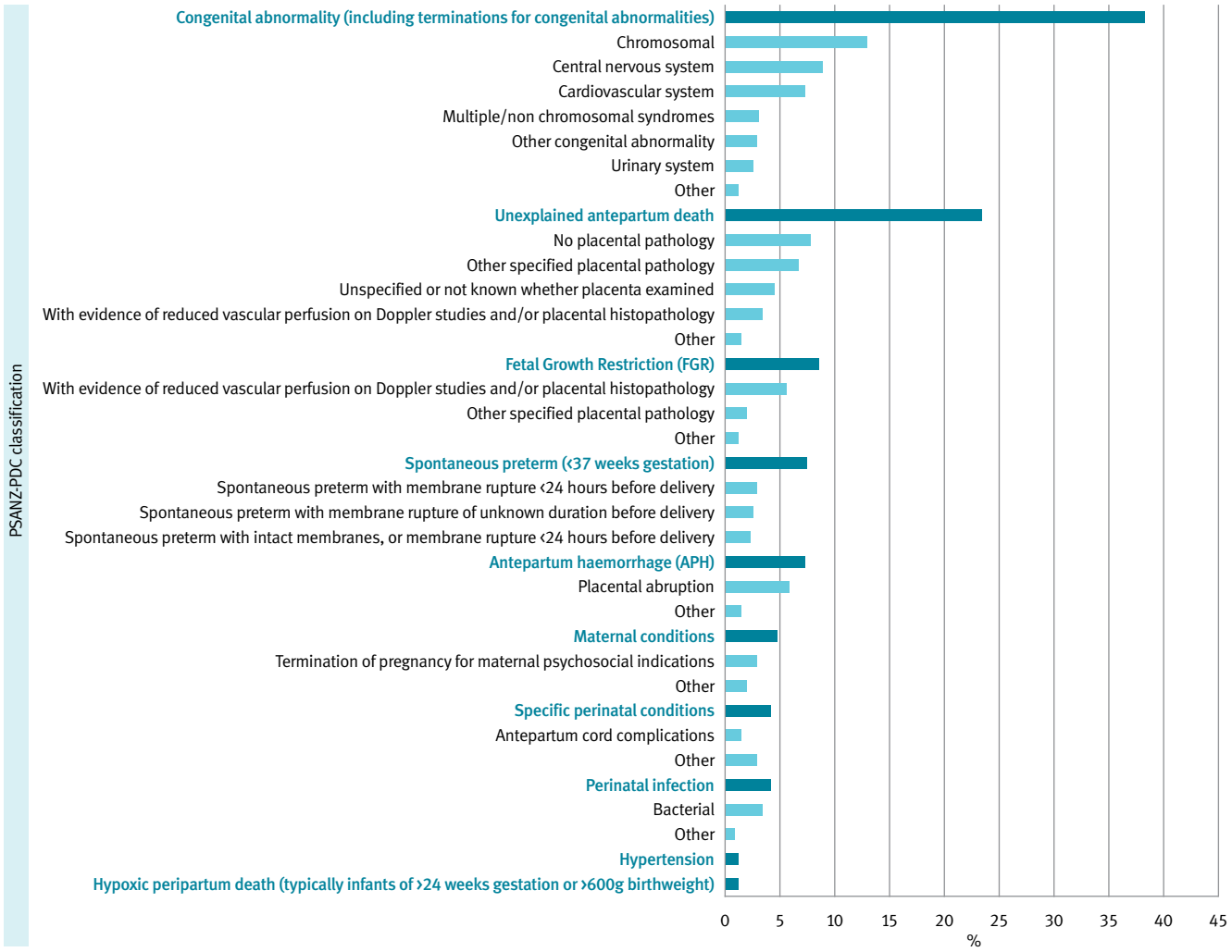
Causes of perinatal deaths

The PSANZ perinatal mortality classification system was developed for use in Australia and New Zealand as part of the process of clinical audit of perinatal deaths[65].

The classification system includes a PSANZ Perinatal Death Classification (PSANZ-PDC) for classifying the main obstetric antecedent factor that led to the chain of events resulting in the stillbirth or neonatal death, and a Neonatal Death Classification (NDC) for classifying the main condition in the neonatal period that caused the death. For approximately half of all perinatal deaths, the PSANZ classifications are assigned by the QMPQC's Perinatal Mortality Sub-Committee (PMSC) following consideration of all available clinical information for each perinatal death. Maternity services with experienced perinatal and maternal mortality review committees, submit classified perinatal deaths to the QMPQC and therefore, these are not classified by the PMSC.

Figures 15a, 15b, 16a and 16b show the PSANZ-PDC causes of death for stillbirths and neonatal deaths in 2018 and 2019. The PSANZ classification system was revised in 2017 to improve placental pathology and unexplained stillbirth classification, with the new classification taking effect from January 1st, 2019. Thus, the previous PSANZ classification (version 2.2) was used for 2018 data while the latest classification (version 4.3) was used for data in 2019. The leading cause of stillbirths was congenital anomaly, accounting for 38.3 percent of all stillbirths in 2018 and 32.6 percent in 2019. This proportion is much higher than many international reports[66]. However, international comparisons are problematic due to differing definitions (including gestation age cut-off and whether terminations are excluded)[74]. There are also major international differences in the laws governing late termination of pregnancy (e.g. different gestational age limits) which impact on reported stillbirth rates.

Figure 15a: Stillbirths by PSANZ-PDC classification as proportion of all stillbirths, Queensland, 2018



Only sub-categories with frequency of at least 5 tabulated individually.

65 PSANZ Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Appendix J – Perinatal Mortality Classifications – Quick Reference Sheet

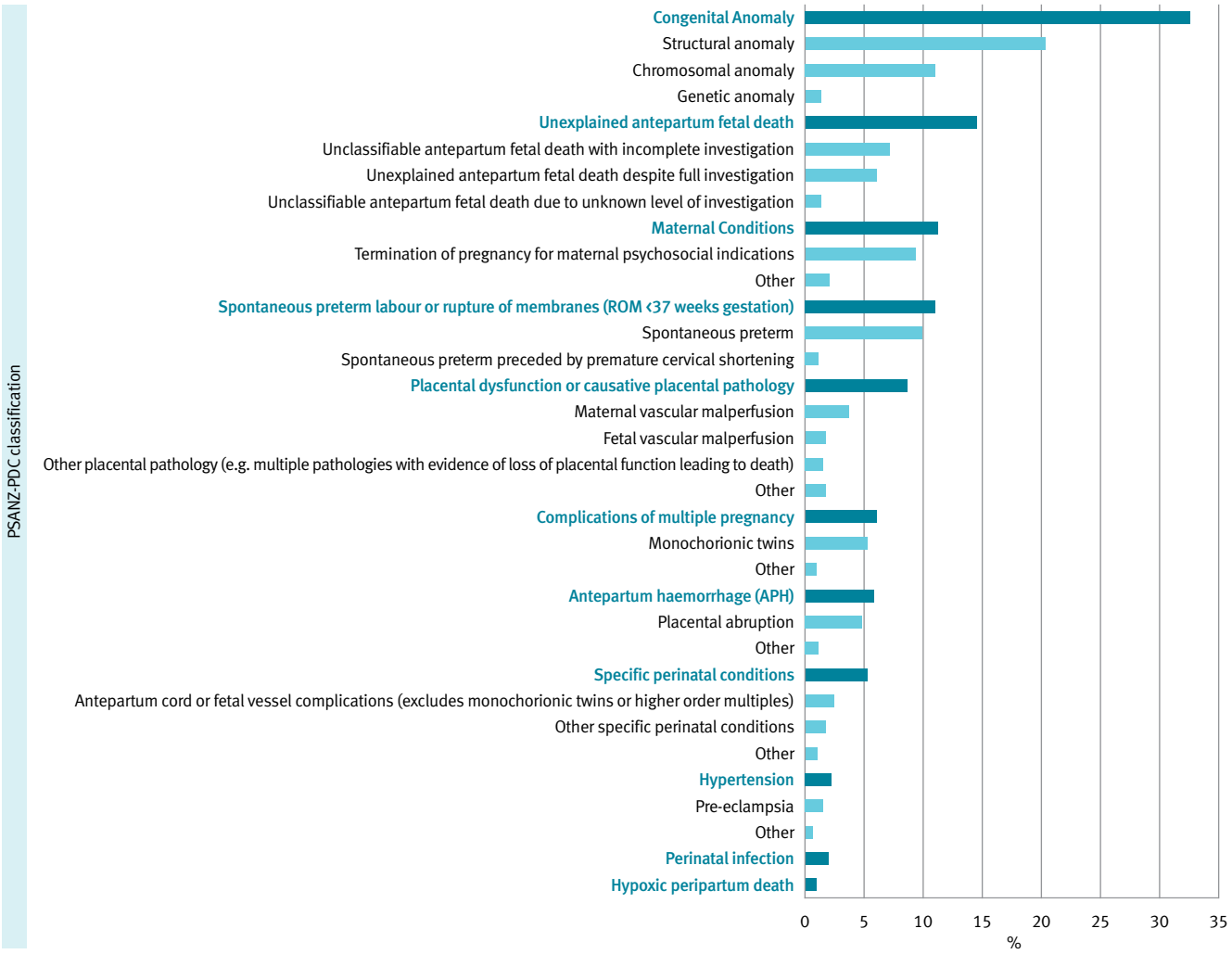
66 Flenady V, Wojcieszek AM, Middleton P, Ellwood D, Erwich J, Coory M, Khong TY, Silver RM, Smith G, Boyle FM, et al. Stillbirths: Recall to action in high-income countries. Lancet 2016; 387: 691–702 Published Online January 18, 2016

Approximately one quarter (23.4 percent) of stillbirths in 2018 and 14.0 percent in 2019 were classified as unexplained (Figures 15a and 15b), and at term these proportions increased to 44.4 percent in 2018 and 29.6 percent in 2019[67]. However, the proportion of stillbirths classified as unexplained is likely to be overestimated due to the poor uptake of perinatal investigations. A possible contributor to the high rate of unexplained causes of stillbirths is the low autopsy rate. Compared with 2018, the lower rate of unexplained stillbirths in 2019 could be partially due to the use of the recently revised PSANZ classification for 2019 data, which has improved placental pathology and unexplained stillbirth classification.

In 2018, the leading PSANZ-PDC cause of neonatal deaths was spontaneous preterm birth, (41.6 percent, Figure 16a), which led to complications in the neonatal period causing the death; while in 2019, in the revised PSANZ-NDC classification, spontaneous preterm birth (30.8 percent) and congenital abnormality (30.3 percent) were the leading causes of neonatal deaths (Figure 16a).

Figures 17a and 17b show the neonatal deaths by PSANZ-NDC classification as a proportion of all neonatal deaths.

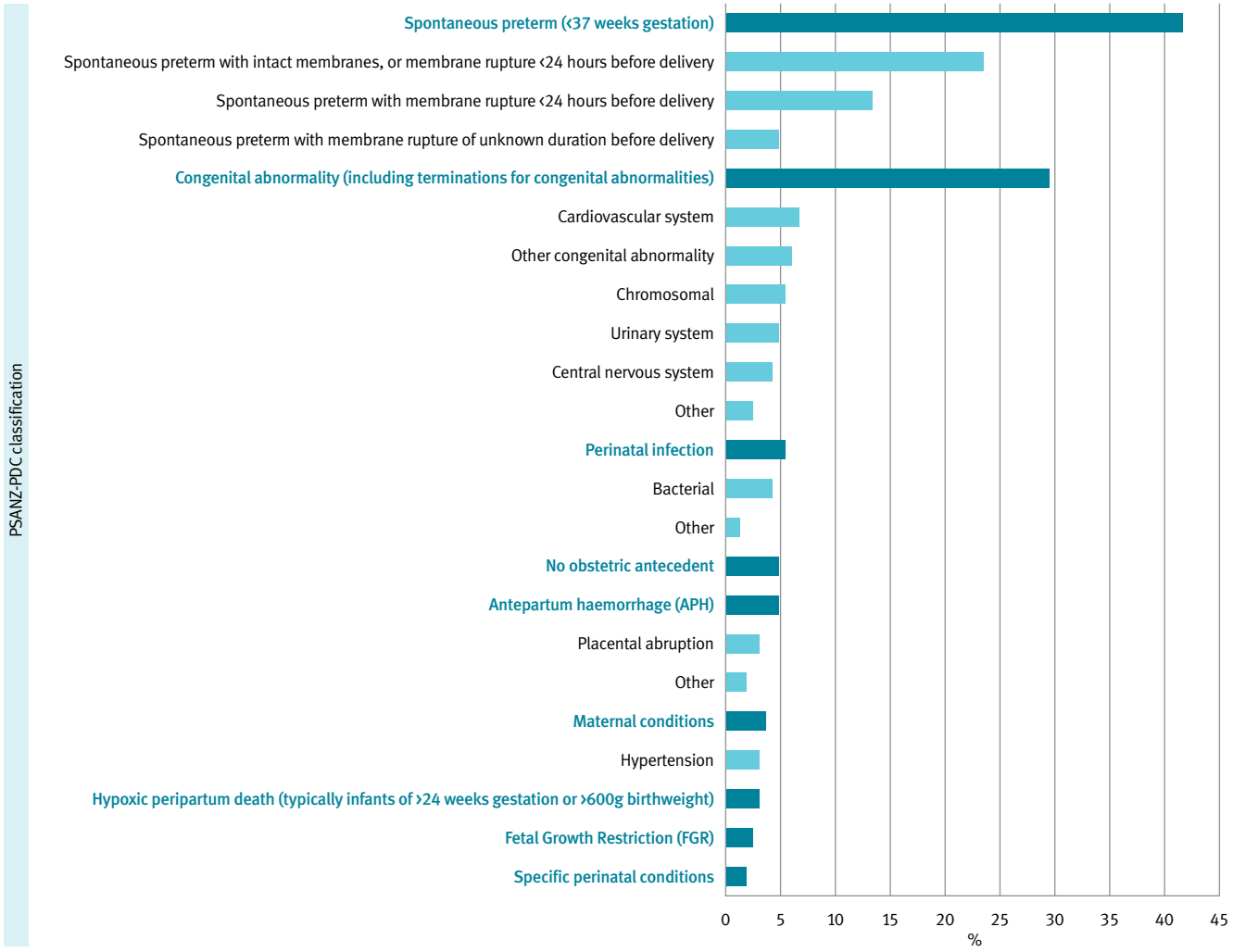
Figure 15b: Stillbirths by PSANZ-PDC classification as proportion of all stillbirths, Queensland, 2019



Only sub-categories with frequency of at least 5 tabulated individually.

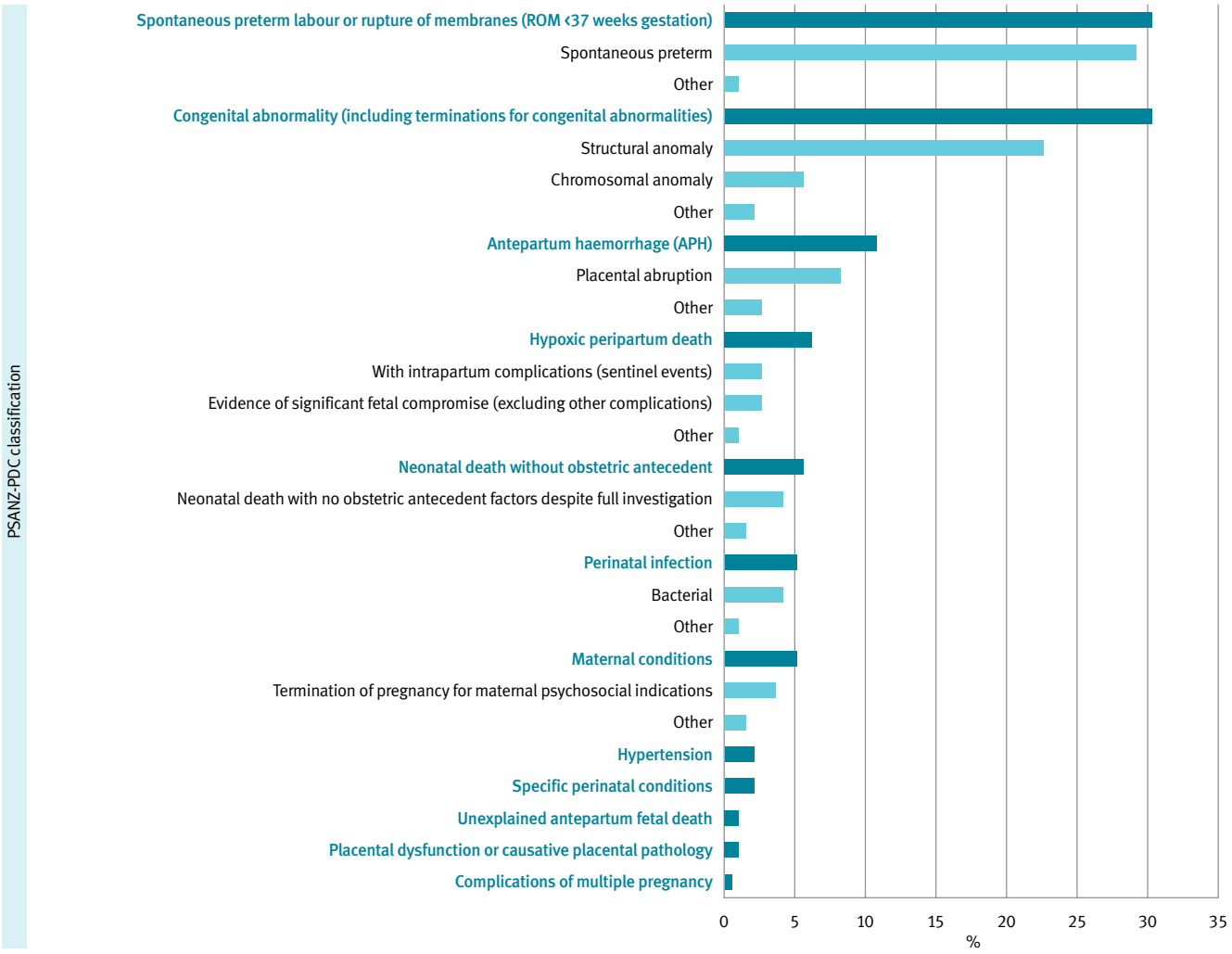
67 Queensland Health, Statistical Services Branch (2020). Causes of Perinatal Deaths, Queensland [Data file]

Figure 16a: Neonatal deaths by PSANZ-PDC classification as proportion of all neonatal deaths, Queensland, 2018



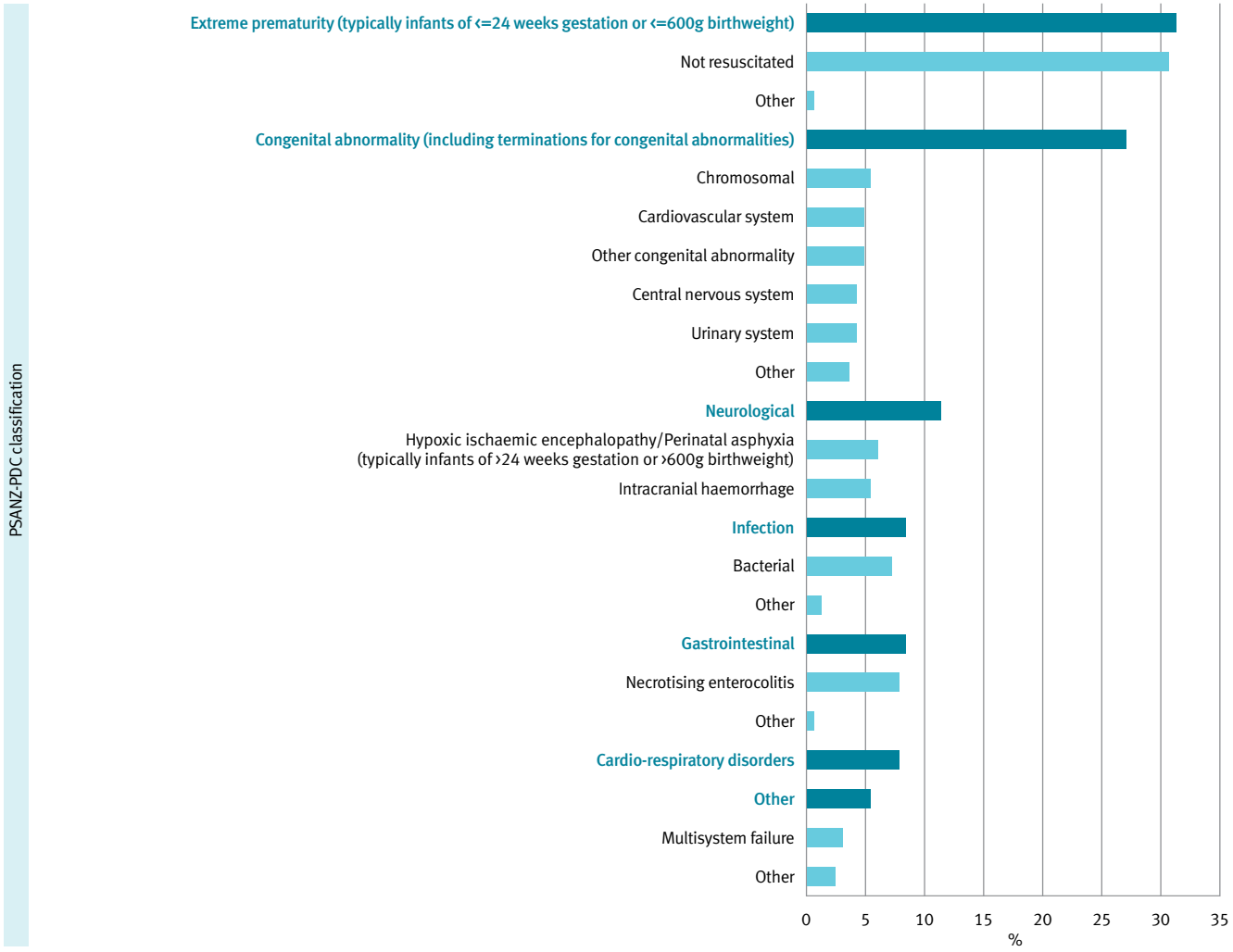
Only sub-categories with frequency of at least 5 tabulated individually.

Figure 16b: Neonatal deaths by PSANZ-PDC classification as proportion of all neonatal deaths, Queensland, 2019



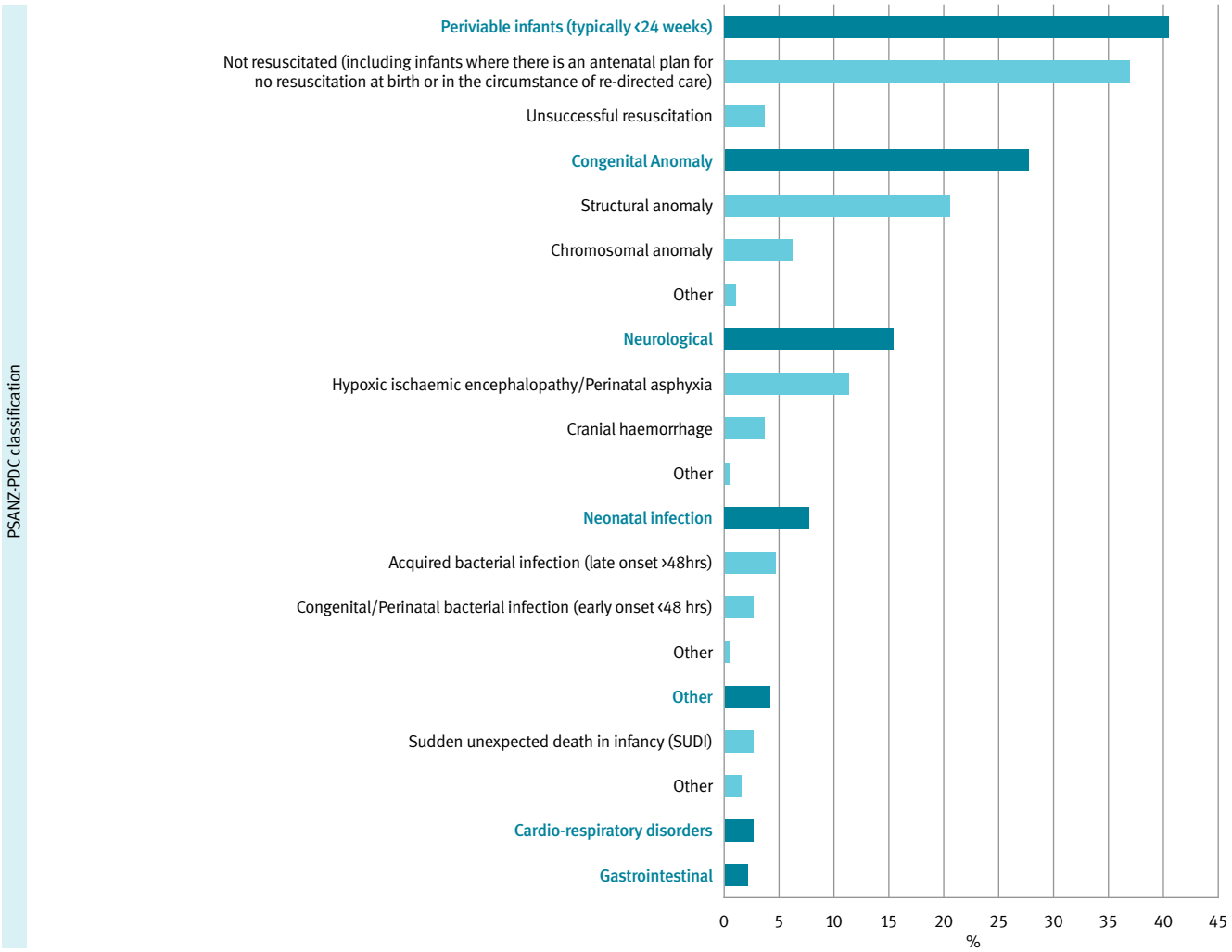
Only sub-categories with frequency of at least 5 tabulated individually.

Figure 17a: Neonatal deaths by PSANZ-NDC classification as a proportion of all neonatal deaths, Queensland, 2018



Only sub-categories with frequency of at least 5 tabulated individually.

Figure 17b: Neonatal deaths by PSANZ-NDC classification as a proportion of all neonatal deaths, Queensland, 2019



Only sub-categories with frequency of at least 5 tabulated individually.

Causes of death vary by factors such as gestational age, maternal age, plurality and Aboriginal and Torres Strait Islander status. An interactive list of PSANZ causes of death by these factors is available at https://www.health.Queensland.gov.au/hsu/dashboards/psanz.xlsm

While most stillbirths are due to antepartum fetal death, attention to intrapartum deaths is important due to the potential for prevention, particularly in late gestation.

Trends in intrapartum deaths (excluding ToPs and congenital anomalies) over the period 1999–2019 (by triennia) show a steady decline from 0.8/1000 to 0.3/1000 births with the largest reduction seen for intrapartum stillbirths 29–36 weeks with a reduction from 1.5/1000 in the period 1999–2001 to 0.1/1000 births in 2017–2019 (Table 16). The rate of intrapartum stillbirths at term was close to 0 at 0/1000 births in 2017–2019 (4 deaths per 164,213 births).

Table 16: Rates of intrapartum death (excluding congenital abnormalities and terminations of pregnancy), by triennia and gestational age, babies whose births were recorded in Queensland facilities, 1999–2019

Gestation weeks	Years	Intrapartum deaths	Births	Rate (per 1,000 births)
20–24	1999–2001	75	385	194.8
	2002–2004	84	416	201.9
	2005–2007	96	462	207.8
	2008–2010	88	503	175
	2011–2013	75	443	169.3
	2014–2016	66	456	144.7
	2017–2019	49	377	130.0
25–28	1999–2001	6	676	8.9
	2002–2004	8	663	12.1
	2005–2007	4	703	5.7
	2008–2010	8	775	10.3
	2011–2013	3	723	4.1
	2014–2016	3	727	4.1
	2017–2019	4	699	5.7
29–36	1999–2001	15	10,280	1.5
	2002–2004	7	11,200	0.6
	2005–2007	8	13,152	0.6
	2008–2010	6	13,868	0.4
	2011–2013	6	14,786	0.4
	2014–2016	2	14,986	0.1
	2017–2019	2	14,616	0.1
37+	1999–2001	18	135,366	0.1
	2002–2004	24	137,254	0.2
	2005–2007	15	156,748	0.1
	2008–2010	20	169,082	0.1
	2011–2013	16	171,782	0.1
	2014–2016	19	171,029	0.1
	2017–2019	4	164,213	<0.1

Excludes babies born at less than 20 gestation weeks, babies with unknown gestation weeks, and babies who died prior to commencement of birth.

Intrapartum deaths are deaths of babies whose heart beat ceased during labour but before birth, as recorded in the heartbeat field in the Queensland Perinatal Data Collection.

Terminations of pregnancy/congenital abnormalities are defined by at least one of the following:

- A PSANZ Perinatal Death Classification (PSANZ-PDC) category 1 (Congenital anomalies, including terminations for congenital anomalies) recorded for the baby.
- An ICD-10-AM code of P96.4 (termination of pregnancy, affecting fetus and newborn) recorded as a cause of death for the baby.
- An ICD-9-CM code of 779.6 (termination of pregnancy (fetus)) recorded as a cause of death for the baby.
- Where the baby was a singleton, an ICD-10-AM code of O04 (medical abortion) recorded for the mother.
- Where the baby was a singleton, an ICD-9-CM code of 635 (legally induced abortion) recorded for the mother.

The coding of terminations of pregnancy has not been individually checked prior to 2005. Terminations of pregnancy prior to 2005 should be interpreted with caution.

Recommendation

That Queensland Health consider designating appropriately resourced tertiary perinatal pathology centres, for the performing of perinatal and neonatal autopsy investigation by perinatal pathologists. This, together with appropriate staffing, to ensure timely high-quality investigation of stillbirths and neonatal deaths, is vital.

That all maternity services should standardise their perinatal mortality reviews and incorporate the APMCAT[3] into their local perinatal mortality reviews. The resulting underlying causes of stillbirths should be classified using the PSANZ perinatal mortality classification system and include an assessment of suboptimal care factors.

Good practice point

The option of a high-quality autopsy examination should be offered to all parents following, or who are anticipating a perinatal death, with counselling on the procedure provided by a senior clinician working in collaboration with a clinician; ideally the known midwife, with whom the family has an established relationship.

In addition to the offer of autopsy, as a minimum for all stillbirths, a comprehensive maternal and pregnancy history plus placental histopathology; testing for feto-maternal haemorrhage; cytogenetics, molecular and other investigations, as indicated according to the PSANZ Guidelines, should be performed.

Parents need to be given the opportunity to discuss the results of all investigations with someone skilled and experienced in this specialised field, recognising that in some cases this may require a referral to a tertiary perinatal centre.

Perinatal mortality review

Investigating the causes of stillbirth and neonatal deaths

The purpose of an autopsy is to accurately identify the cause(s) of death. Autopsy results contribute to clinical audit and assist with identification of factors contributing to the death. Perinatal autopsy examinations require written consent from the parent(s) following informed discussions. A full and detailed perinatal autopsy, including all ancillary investigations performed by an appropriately trained and experienced perinatal pathologist, is the gold standard for investigation of stillbirths and neonatal deaths. The autopsy investigations include microbiology, radiology, and appropriate molecular genetics, as well as the detailed and careful macroscopic dissection and histology.

Perinatal autopsy is important to ensure high quality perinatal autopsies are performed by experienced perinatal pathologists. Most other States/Territories in Australia have established specific centres to undertake these autopsies. Queensland has a partially centralised autopsy service at the Royal Brisbane and Women's Hospital, Mater Hospital, Sunshine Coast University Hospital and Gold Coast University Hospital. However, there is nothing to prevent any pathologist in Queensland, regardless of experience and training in this specialised field, from undertaking a perinatal autopsy of variable quality. It is recommended that Queensland Health follow the example of other health jurisdictions and establish recognised and appropriately staffed tertiary centres, where perinatal and neonatal autopsies are performed by recognised and experienced perinatal pathologists.

There is no legal requirement in Queensland to perform an autopsy in all cases of stillbirth and neonatal death. Just over one third of stillborn babies had an autopsy in 2018 and 2019 (38.3 percent) compared to the National autopsy uptake rate of 41.3 percent for 2019[25]. The autopsy rate for stillbirths has mildly increased over the past decade. The rate of neonatal death autopsy in 2018 and 2019 was much lower than stillbirth autopsy rates at only 22.9 percent with a national rate of 26.7 percent for 2019[25]. In perinatal deaths occurring after 34 weeks' gestation, placental histological examination by a pathologist was conducted in (98.8 percent) of cases. This represents good compliance with current recommendations and guidelines for perinatal mortality investigations.

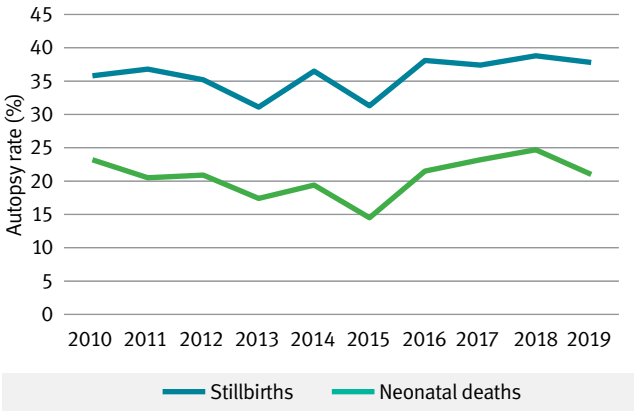
Low perinatal autopsy rates are also of concern internationally and have been attributed to lack of appropriately skilled pathologists; poor staff knowledge and confidence; negative attitudes about the value of autopsy; parents' difficulty in making the decision at a time of intense grief[63]; controversy over past practices of organ retention, and complex consent requirements. Parents need clear and consistent information delivered in a timely and sensitive manner to enable informed decision-making. Where stillbirth or neonatal death is anticipated, these discussions can be had sensitively during antenatal care. Counselling parents about the option of an autopsy should be carried out by a senior health care professional who has a detailed understanding about the procedure. This should also occur in collaboration with a clinician who has an established relationship with the family[68].

Informed Consent – Autopsy | Queensland Health
Perinatal and Fetal Autopsy Consent and Clinical Summary | Queensland Health[69]

68 PSANZ Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Section 4 – Perinatal Autopsy Including Placental Assessment

69 Perinatal and Fetal Autopsy Consent and Clinical Summary | Queensland Health

Figure 18: Stillbirth and neonatal deaths autopsy rates, Queensland, 2010–2019



The PSANZ bi-national guidelines on perinatal mortality recommend core investigations for both stillbirths and neonatal deaths[70]. The Queensland Clinical Guidelines has adopted the guideline for stillbirth investigation[71].

The PSANZ Guideline recommendations align with the recent WHO Guidelines, which recommend that all maternity services implement high quality perinatal mortality audit, including classification and consideration of contributing (substandard care) factors for every stillbirth and neonatal death[67,72].

Stillbirths and neonatal deaths are rare events in smaller centres. This can result in a lack of experience in perinatal mortality audit and substandard processes at the local facility level. The PMSC has discussed how best to address this issue and a 'hub and spoke' model has been suggested (i.e. where smaller hospitals link to their larger regional counterpart for support in the management of perinatal mortality audit).

It is acknowledged that healthcare providers prefer to evaluate their own care and can do so effectively through Perinatal and Maternal Mortality Review Committees (PMMRCs) and comprehensive clinical incident analysis. Perinatal mortality audit undertaken at the local level is recommended by the QMPQC. After changes prompted by the QMPQC in 2016, to Section 29(1) of the Hospital and Health Boards Regulation 2012, where stillbirths were included as a reportable event, the QMPQC developed a guidance paper to assist HHSs in determining which stillbirths required in-depth analysis[73].

The clinical governance necessary to support implementation of a 'hub and spoke' model is an essential factor and requires commitment from Hospital and Health Service clinical administrators. Co-operation between the larger facility perinatal audit team and/or PMMRCs (the hub) and the local audit group (spoke), as well as feedback to care providers, must be embedded in the implementation strategy. The PMSC is working to progress a pilot 'hub and spoke' model with the aim of demonstrating the benefits of establishing it as a statewide model.

Suggested 'hub and spoke' model

There are 16 HHSs from which eight hubs – four primary and four secondary, could operate. The hub-and-spoke organisational design is a model which arranges service delivery assets into a network consisting of an anchor establishment (hub) which supports secondary establishments (spokes) which offer more limited-service arrays. This has the potential to fulfil the requirements for timely perinatal mortality audit, including classification of perinatal deaths, local and national and reporting.

- Cairns – a hub serving the Torres and Cape HHS, North West HHS and Cairns Hinterland HHS
- Townsville – a hub serving Townsville HHS, Central West HHS and Mackay HHS
- Rockhampton – a hub serving Central Queensland HHS and Wide Bay HHS
- Ipswich – a hub serving West Moreton HHS, Darling Downs HHS and South West HHS
- Sunshine Coast
- Metro North
- Metro South
- Gold Coast.

Recommendation

That all maternity hospitals have effective processes (e.g. via Perinatal and Maternal Mortality Review Committees (PMMRCs) in place to ensure all perinatal deaths are appropriately investigated and classified according to the PSANZ national guidelines, for cause of death and contributing factors relating to care.

70 PSANZ Clinical Practice Guidelines for Care Around Stillbirth and Neonatal Death

71 Queensland Maternity and Neonatal Clinical Guidelines

72 World Health Organisation. Making every baby count: audit and review of stillbirths and neonatal deaths

73 Comprehensive clinical incident analysis following stillbirth – Criteria for stillbirth analysis. QMPQC webpage – Resources and Reports

Recommendations

That all larger maternity facilities should have credentialled educators to deliver IMPROVE (Improving Perinatal Review and Outcomes via Education) workshops to help increase the uptake of perinatal autopsies and investigations in Queensland.

IMPROVE program

In partnership with the Stillbirth CRE and The Perinatal Society of Australia and New Zealand (PSANZ), Clinical Excellence Queensland is committed to the ongoing education of health professionals on care practices around perinatal mortality by co-funding IMPROVE (Improving Perinatal Review and Outcomes via Education) workshops throughout Queensland.

The IMPROVE program has been developed for maternity health care professionals to enhance the uptake of the Clinical Practice Guidelines for Perinatal Mortality to improve standards in clinical practice around the time of a perinatal death. IMPROVE is an interactive, skills-based workshop which involves small groups of learners rotating around six interactive learning stations and involves a short introduction and formative assessment, all delivered by experienced and trained educators. The aim of IMPROVE is to increase the uptake of best practice in investigating and reporting the causes and contributing factors of perinatal deaths, as well as discussions and consent for autopsy (see Appendix D, page 80).

The IMPROVE workshop and eLearning program are both accredited by the Australian College of Midwives, RANZCOG and the Australian College of Rural and Remote Medicine, with CPD points available upon completion.

For further information about upcoming workshops or if you would like to arrange a workshop contact Stillbirth CRE team; improve@mater.uq.edu.au

The eLearning module can be accessed here; https://learn.stillbirthcre.org.au/

Contributing factors relating to care (substandard care)

This report presents the findings of the second perinatal confidential enquiry carried out as part of the Perinatal Mortality Sub-Committee (PMSC) body of work. The PMSC undertook a review of selected perinatal deaths occurring after 34 weeks' gestation to identify contributing factors relating to care (substandard care factors). The review of perinatal deaths is the key to improving perinatal outcomes by: (a) identifying potentially avoidable deaths and (b) using the examination of clinical circumstances surrounding these deaths, to improve the safety and quality in healthcare systems. The aim of the review process was to systematically identify and classify modifiable components of the health care system. This includes a broad spectrum of organisational and/or management factors, personnel factors and barriers for women accessing care. This enquiry also enables Queensland to contribute to the AIHWs National Perinatal Data Collection, which informs their annual reporting activities.

In 62 percent of the reviewed perinatal deaths, substandard care factors were identified that were either significantly, possibly or insignificantly attributed to the outcome. Whilst this represents a decrease of nine percent in substandard care factors from the previous 2019 report, the results of the reviews echo previous critical gaps in care and missed opportunities.

Method

Inclusion criteria

A retrospective audit of all Queensland stillbirths and neonatal deaths occurring from 34 weeks gestation or more up to 28 days of age, excluding major congenital anomalies over the period 1 January 2019 to 31 December 2019, was performed.

Case selection and data sources

All perinatal deaths fulfilling the inclusion criteria were identified through the Queensland Perinatal Data Collection (QPDC). The QPDC also provided maternal demographic information for each included perinatal death.

Clinical information for each included perinatal death was sought by the QMPQC Clinical Midwife Consultant from the Directors of Obstetrics (or equivalent) and/or Patient Safety and Quality Officer at each of the services where the perinatal death occurred. The requested information included the following:

- Pregnancy hand-held records
- Queensland Health Hospital and Health Service (HHS) records
- Private Maternity Hospital records
- Records (ieMR)
- Human Error and Patient Safety (HEAPS) and Root Cause Analysis (RCA) reports
- Completion of the Australian Perinatal Mortality Clinical Audit Tool (APMCAT)[3].

In addition, further information was sourced from:

- General Practitioners
- Private obstetric specialists
- Private practice midwives
- Internal and external pathology providers' records
- Medical Imaging service providers' records
- Coroner's reports.

Good practice point

Hospital and Health Services should conduct multidisciplinary review of all perinatal deaths to identify contributing factors across all levels of the service. To achieve this, multidisciplinary mortality and morbidity review committees (e.g. PMMRCs) led by a senior clinician, need to be established and convened on a regular basis, for example, quarterly. According to the PSANZ Guidelines, these committees need to have a clearly defined process for case review, which includes identification of contributing factors from which recommendations are developed and documented. An action schedule should be generated and reviewed at the next meeting to ensure completion. Any findings should be shared with appropriate staff to facilitate learnings and improvements in healthcare provision.

Hospital and Health Services should prepare and provide quarterly mortality and morbidity review committee reports to the QMPQC for monitoring and to enable support of the review process as necessary.

Classification of all perinatal deaths by health service providers needs to be carried out in an efficient manner and provided to the Department of Health, Queensland Perinatal Data Collection to allow for validation and timely national reporting.

Assessment of contributing factors

A multidisciplinary expert group conducted face-to-face reviews of each perinatal death to determine the presence of contributing factors and if present, the degree to which the relevant factor contributed to the death. The assessment of quality care provision was determined in the following aspects of the pathway of care:

- Antenatal care
- Intrapartum care
- Postnatal care
- Neonatal care
- Post-mortem investigations (autopsy, placental histology and chromosome analysis).

The APMCAT recommended by PSANZ in the Guidelines for Care around Stillbirth and Neonatal Death, was used to allocate contributing factors to one of three major groups[74]:

- Organisation and/or management (e.g. inadequate supervision of staff, lack of appropriate clinical management protocols, lack of communication between services)
- Personnel (e.g. staff factors relating to professional care and service provision)
- Accessing/engaging with care (e.g. no antenatal care; infrequent or late booking for antenatal care; women decline treatment/advice).

The contribution of each factor to the death was then specified as:

- Insignificant (sub-optimal factors identified but unlikely to have contributed to the outcome)
- Possible (sub-optimal factors identified–might have contributed to the outcome)
- Significant (sub-optimal factors identified–were likely to have contributed to the outcome).

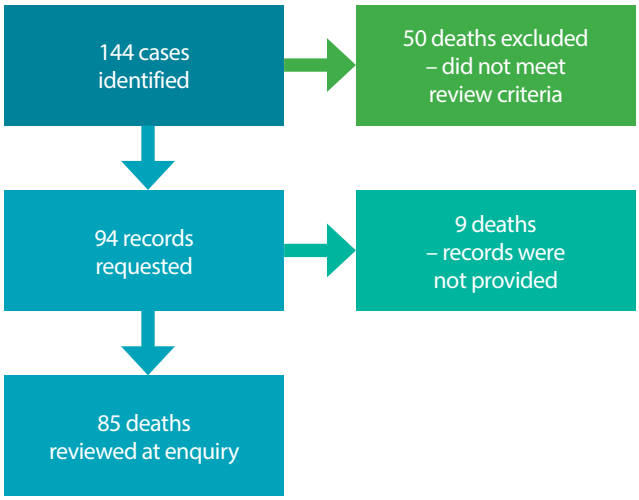
The multidisciplinary expert group consisted of 10 members which included the following: a perinatal pathologist, maternal fetal medicine specialist, an obstetrician, midwives from the private and public sector, a clinical epidemiologist with experience in audit processes, a neonatologist and a consumer representative. Panel meetings were always face-to-face discussions generally lasting four hours, with up to 10 cases reviewed at each session. The PMSC Chair and QMPQC Clinical Midwifery Consultant ensured there was consistency and standardisation of the process and that the objectives of the reviews were met.

Substandard care was determined as being present if care was not managed according to accepted evidence-based best practice[75]. The Queensland Maternity and Neonatal Clinical Guidelines was the primary point of reference used by the panel. Other evidence-based sources included the National Clinical Practice Guidelines: Pregnancy Care[76], RANZCOG and reputable peak international sources such as the Royal College of Obstetricians and Gynaecologists[77].

Results

There were 144 perinatal deaths identified from the QPDC as being potentially eligible for inclusion (97 stillbirths and 47 neonatal deaths). Of these, 50 perinatal deaths were excluded upon further screening due to the presence of a major congenital abnormality. Of the remaining 94 deaths (71 stillbirths and 23 neonatal deaths), nine deaths were unable to be reviewed due to information not being provided: eight deaths in the private sector and one homebirth, leaving 85 perinatal deaths included in the enquiry (Figure 19).

Flowchart 2: Flowchart for perinatal deaths selected for confidential enquiry



The remaining 85 perinatal deaths were reviewed by the panel: 66 (78 percent) stillbirths and 19 (22 percent) neonatal deaths.

74 Care around the time of stillbirth and neonatal death guidelines group. Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Version 3, NHMRC Centre of Research Excellence in Stillbirth. Brisbane, Australia, March 2018

75 Queensland Maternity and Neonatal Clinical Guidelines

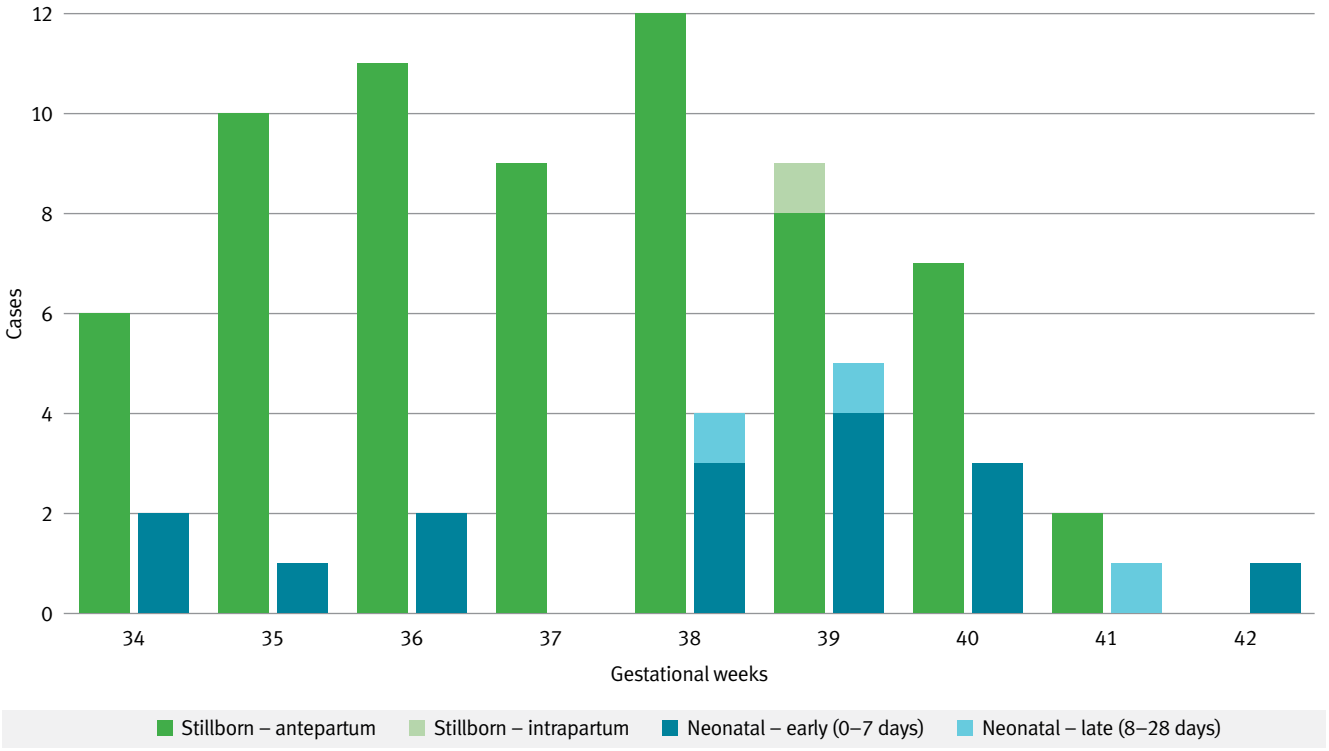
76 Department of Health (2019). Clinical Practice Guidelines: Pregnancy Care. Canberra: Australian Government Department of Health

77 Royal College of Obstetricians and Gynaecologists (RCOG). Guidelines and research services

Timing of perinatal deaths

Most stillbirths (98.5 percent) occurred before labour commenced. In relation to neonatal deaths, the majority (84.2 percent) occurred in the early neonatal period (Figure 19).

Figure 19: Perinatal death by timing and gestational age



Early neonatal mortality refers to the death of a live-born baby within the first seven days of life.
Late neonatal mortality refers to death after 7 days until 28 days.

Key maternal characteristics

Characteristics of the included cases were compared with all similar Queensland births that did not result in a perinatal death (Table 17). While numbers are small and should be interpreted with caution, the perinatal deaths included in this review appeared to be higher amongst babies born to women of these categories:


Age under 20


Body mass index (BMI) of 35 or more


Smoking in pregnancy


Hypertension


Pre-existing or gestational diabetes


0–4 antenatal visits only


South Asian or African ethnicity

Table 17: Maternal demographics and place of birth of included perinatal deaths compared with all births, 34 weeks or more gestation Queensland, 2019

	All Queensland		Perinatal deaths	
Characteristic	Number	%	Number	%
Aboriginal and/or Torres Strait Islander	4,218	7.3	7	8.2
Nulliparous	23,724	41.3	33	38.8
Maternal BMI				
Underweight <18.5	2,865	5.0	4	4.7
Normal 18.5–<25	27,644	48.5	39	45.9
Overweight 25–29.9	13,834	24.3	19	22.4
Obese 1 30–34.9	7,248	12.7	9	10.6
Obese 2 35–39.9	3,307	5.8	8	**9.4**
Obese 3 40+	2,090	3.7	5	**5.9**
Unknown			1	1.2
Maternal age				
<20	1,627	2.8	5	**5.9**
20–34	43,302	75.3	59	69.4
35–39	10,386	18.1	18	21.2
40+	2,170	3.8	3	3.5
Pre-existing and/or arising in pregnancy conditions				
Hypertension	3,981	6.9	9	**10.6**
Diabetes	8,964	15.6	20	**23.5**
Smoking before 20 weeks	6,540	11.4	15	**17.6~**
Facility type				
Public facilities	44,309	77.1	76	89.4
Private facilities	13,023	22.7	8	9.4
Home/free births	153	0.3	1	1.2

Table 17: Maternal demographics and place of birth of included perinatal deaths compared with all births, 34 weeks or more gestation Queensland, 2019

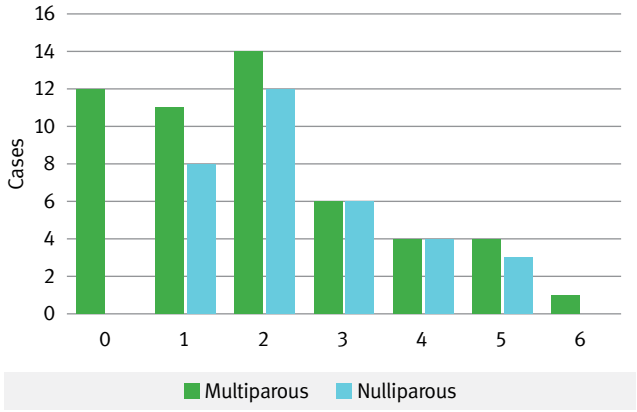
	All Queensland		Perinatal deaths	
Characteristic	Number	%	Number	%
Maternal country of birth				
Australia	40,934	71.3	57	67.1
Other countries in Oceania	3,633	6.3	5	5.9
South Africa	629	1.1	2	2.3
Other countries in Africa	1,099	1.9	3	**3.5**
Canada	240	0.4	1	1.2
United States of America	283	0.5	1	1.2
Hong Kong	142	0.2	1	1.2
India	1,802	3.1	6	**7.1**
Philippines	813	1.4	2	2.3
China	1,012	1.8	2	2.3
Other countries in Asia	1,331	2.3	4	4.7
United Kingdom	1,381	2.4	1	1.2
Antenatal visits				
<2	229	0.4	2	**2.4**
2 to 4	1,859	3.2	9	**10.6**
5 to 7	8,349	14.5	16	18.8
8+	47,043	81.8	58	68.2

~ Smoking before 20 weeks gestation.

Risk factors for stillbirth

A series of maternal characteristics have been shown to be associated with an increased risk of stillbirth. In this review, well known risk factors[78] for stillbirth were present in most included perinatal mortality cases (84.9 percent). More than 63.5 percent of the perinatal deaths had more than one risk factor – nulliparity was the most frequent single risk factor (38.8 percent) (Figure 20).

Figure 20: Count of stillbirth risk factors per case by parity status



Other frequent risk factors included pre-existing or gestational diabetes (23.5 percent) and hypertension (10.6 percent).

Causes of perinatal deaths included in the review

The causes of perinatal deaths were classified according to the PSANZ Perinatal Mortality Classification System, version 2.3 (2018). The PSANZ Perinatal Mortality Classification System classifies all perinatal deaths (stillbirths and neonatal deaths) by the single most important factor that led to the chain of events which resulted in the death.

The most commonly classified causes of all perinatal deaths in this cohort were unexplained antepartum death (29.4 percent). Other frequent causes of death were placental dysfunction/pathology (14.1 percent) as shown in Table 18, antepartum haemorrhage (11.8 percent), specific perinatal conditions such as feto-maternal haemorrhage and cord occlusion (11.8 percent) and lastly, hypoxic peripartum death (10.6 percent) (Table 18).

For neonatal deaths, the most frequent primary PSANZ NDC category was neurological causes: hypoxic ischaemic encephalopathy (HIE) was the cause in 89 percent of neonatal deaths.

Table 18: Primary causes of included perinatal deaths by the PSANZ perinatal death classification (PSANZ PDC)

Perinatal death classification	Stillborn	Neonatal death	Total
Unexplained antepartum fetal death	25	N/A	25
Placental dysfunction/pathology	10	2	12
Antepartum haemorrhage	6	4	10
Specific perinatal conditions	10	0	10
Hypoxic peripartum death	2	7	9
Maternal conditions	6	2	8
Neonatal death without obstetric antecedent	0	3	3
SROM	3	0	3
Complications of multiple pregnancy	2	0	2
Perinatal infection	1	1	2
Hypertension	1	0	1
Total	66	19	85

SROM – spontaneous rupture of membranes.

78 Queensland Maternity and Neonatal Clinical Guidelines. Stillbirth Care

Contributing factors

The review panel found that in more than half of the perinatal deaths reviewed, there were critical gaps in care. Contributing factors were identified in 62.3 percent of perinatal deaths – 57.6 percent stillbirths and 78.9 percent neonatal deaths reviewed (Table 19).

In 34 percent of the perinatal deaths with contributing factors, it was considered that sub-optimal care had **significantly** contributed to the outcome – 61 percent of these perinatal deaths were stillbirths and 39 percent were neonatal deaths (Table 19).

There were 127 contributing factors identified from the review of selected perinatal deaths. 25 were significant (19.7 percent) and 96 were possible (75.6 percent). In just 6 cases (4.7 percent), the contributing factor was rated as insignificant (Figure 21). In many instances, more than one contributing factor was found for each perinatal death reviewed.

The contributing factors covered a broad spectrum of organisational and or management factors, personnel factors and barriers for the pregnant woman accessing or engaging with care (Figure 22).

Figure 21: Contributing factors rating and count

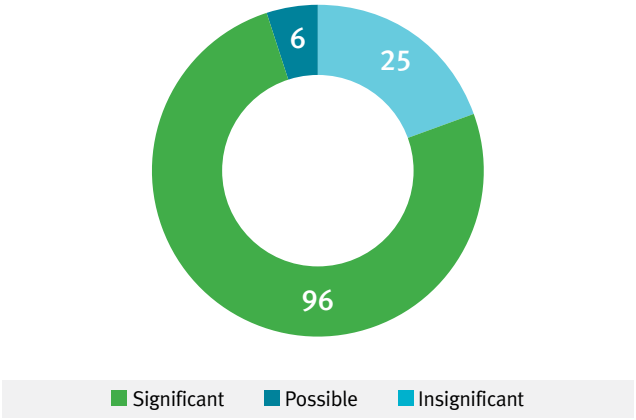
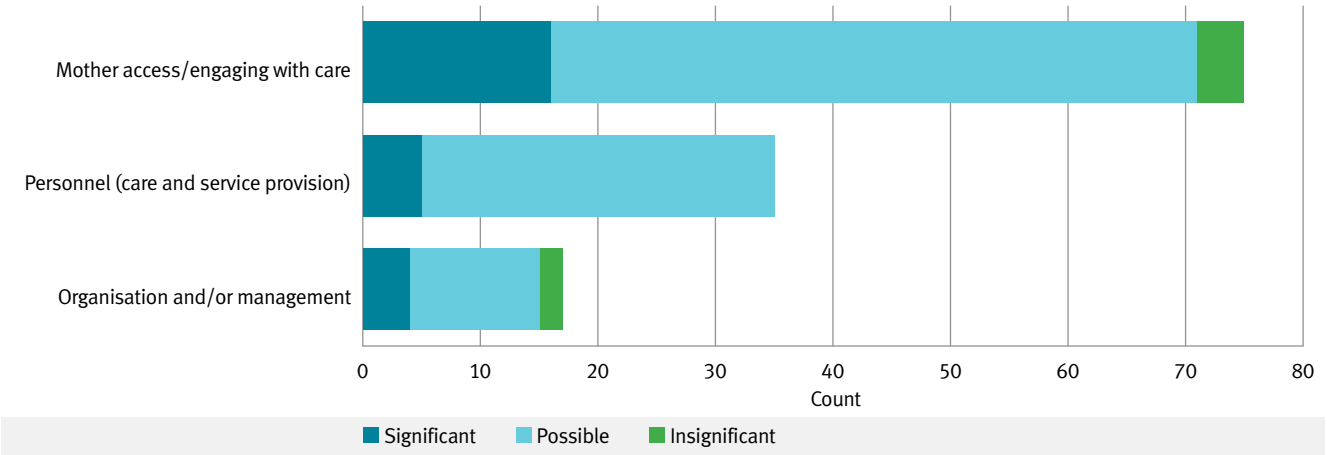


Table 19: Contributing factors in perinatal deaths occurring 34 weeks or more gestation excluding congenital abnormalities, Queensland, 2019

	Stillbirths	Neonatal deaths	Perinatal deaths
Number of deaths reviewed	66 (77.6%)	19 (22.4%)	85 (100%)
Deaths with contributing factor(s) identified	38 (57.6%)	15 (78.9%)	53 (62.3%)
Significant – contributing factors identified that were likely to have contributed to the outcome	11	7	18
Possible contributing factors that might have contributed to the outcome	26	6	32
Insignificant – contributing factors identified that were unlikely to have contributed to the outcome	1	2	3

Figure 22: Contributing factors by type and link to outcome in perinatal deaths 34 weeks or more gestation excluding congenital abnormalities, Queensland, 2019

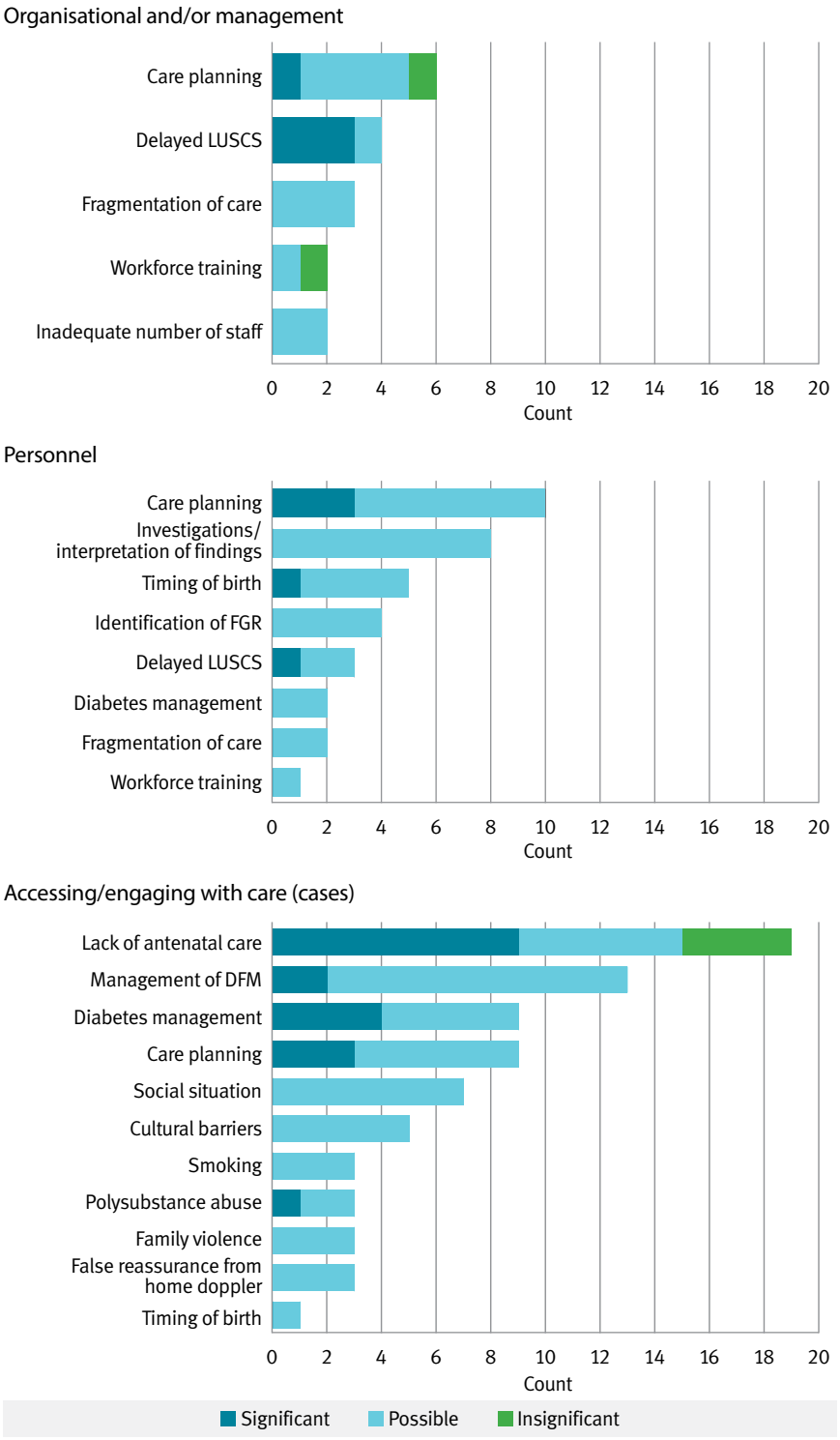


Of the 127 contributing factors grouped by clinical practice improvement areas, the top five significant factors were as follows:

- Women accessing and engaging with recommended antenatal care
- Antenatal care planning for women with known risk factors
- Delayed timing of lower uterine segment caesarean section (LUSCS)
- Managing women with pre-existing and gestational diabetes
- Lack of recognition by the woman of the seriousness of decreased fetal movements

When examined by the PSANZ categories, the most frequent category of contributing factors was classified as: women accessing and engaging with care (59.1 percent; e.g. no antenatal care, infrequent or late booking for antenatal care, women declining treatment or advice). This was followed by personnel (27.6 percent; e.g. staff factors relating to professional care and service provision). The least frequent category was related to organisation and/or management (13.4 percent; Figure 23).

Figure 23: Clinical practice improvement areas by PSANZ contributing factors categories



Key findings

Of the 85 reviewed cases, several sub-standard care factors contributing to perinatal mortality were identified. The systematic approach to the audit of these deaths provided the framework for making numerous good practice points and recommendations to reduce the risks of perinatal death. Of note, several of the key findings are priority areas of the Safer Baby Bundle with best practice care recommendations, clinical care pathways and resources for women endorsed for implementation at all Queensland maternity services.

Of the 85 perinatal deaths reviewed, seven were babies of women who identified as Aboriginal and Torres Strait Islander people. Of concern, 71.4 percent had sub-optimal care factors which contributed to the perinatal death. This is 10 percent higher than the rate for women who do not identify as Aboriginal and Torres Strait Islander people. A broad range of factors contributed to this outcome including: infrequent antenatal care, the availability of Indigenous liaison workers, family violence, socio-economic stress, homelessness, inadequate management of diabetes and delayed presentation for decreased fetal movements.

Women accessing and engaging with recommended antenatal care

In this report, the single most significant suboptimal care factor relating to the death, was the lack of access and engagement with antenatal care (Figure 23). In six of the perinatal deaths, disengagement from maternity care providers was considered to have significantly affected the outcome for the mother and/or the baby. A variety of factors including socio-demographic, socio-economic, cultural and service availability as well as a lack of recognition of the complexity of some pregnancy conditions, appeared to influence women's engagement with care. Models of care that enable continuity by the same provider, should be an overarching key component of quality maternity care. Women who receive their pregnancy care within a continuity model are more likely to be satisfied with their care and engage more readily with their known caregiver. Restricting access to the type or place of care a woman wants, can lead to distrust and disengagement.

Fetal growth assessment

In 25 percent of the perinatal deaths reviewed, the fetal birthweight was below the 10th centile (Table 20). In 86 percent of these cases, there was sub-optimal care in relation to screening for growth disorders. Appropriate screening for fetal growth restriction (FGR) is a key aspect of reducing perinatal mortality.

Table 20: Perinatal deaths with a birthweight less than the 10th centile

<10th centile B weight	Cases	%
No	64	75.3
Yes	21	24.7
Total	85	100.0

Diabetes

Diabetes, both pre-existing and gestational, is a well-known modifiable risk factor for perinatal death. Approximately one quarter (24 percent) of the women in the perinatal deaths review had either pre-existing or gestational diabetes. This was a significant contributing sub-optimal care factor in six deaths. A further 13 percent of women had no screening for gestational diabetes with organisational factors and women declining testing contributing to this figure. Many of these women had recognised risks factors for diabetes such as obesity and high-risk ethnicity – South-Asian or African origin (Table 21).

Table 21: Perinatal deaths (diabetes)

Diabetes	Cases	%
Pre-existing Type I	1	1.2
Pre-existing Type II	5	5.9
Gestational diabetes mellitus – diet	11	12.9
Gestational diabetes mellitus – insulin	2	2.3
Gestational diabetes mellitus – metformin	1	1.2
No	54	63.5
Not done/declined	11	12.9
Total	85	100.0

Decreased fetal movements

As in previous reports, several women appeared to delay presenting for decreased fetal movements. It is recommended that all maternity care providers inform women about movement awareness and actions to take in the event of decreased or absent fetal activity. In 15 percent of the perinatal deaths, women appeared to not present for review in a timely manner. In three of these cases, the use of a home Doppler provided women with a false sense of reassurance about their baby's well-being.

Timing of caesarean section

In six perinatal deaths, the identification of a clinically compromised pregnant woman and/or her baby along with the timely provision of caesarean section (CS), was not responded to accordingly. Whilst the evidence regarding the time interval which minimises the risk of adverse outcomes to mothers and their babies is uniquely challenging, the review highlighted the inconsistent identification and nomenclature used to describe the degree of urgency and the classification of emergency CS. Timely escalation to senior medical staff assists in appropriate clinical management.

Recommendations

That consideration be given to establishing a permanent part-time (0.4FTE) clinical midwife resource to provide discipline specific input across all areas of review by the QMPQC with a focus on reviewing the quality of perinatal mortality reviews and collation of data for contributing factors.

Good practice points

The importance of regular antenatal care to identify emerging risk factors should be highlighted at every antenatal visit. Holistic and sensitive care meeting the woman's individual needs encourages timely intervention and escalation as indicated.

All pregnant women should be screened for risk factors for fetal growth restriction at booking-in and at every subsequent antenatal visit. Symphysis fundal height measurements should be plotted on a growth chart in the second and third trimester of pregnancy. Timely access to serial growth and well-being ultrasound scans where appropriate is required, with follow-up arranged with a senior clinician.

All women should be offered gestational diabetes screening including early testing for those with risk factors. Reasons for declining testing or gestational diabetes treatment should be explored by the treating team.

All maternity care providers should provide information to women about normal fetal movements by 28 weeks gestation. Pregnant women should be reminded at every subsequent antenatal visit to contact their health care provider if they are concerned.

In instances of an abnormal fetal heart trace, the timing of decision to actual LUSCS delivery must be managed by a senior clinician, with potential escalation after consideration of the woman's individual needs and clinical circumstances.

Caution expectant parents about the potential risks of using home fetal dopplers. Include the risks of home fetal doppler use in messaging around decreased fetal movements during antenatal appointments and when clinicians are in contact with concerned expectant parents. Reinforce the importance of early presentation for concerns.

Centre of Research Excellence in Stillbirth (Stillbirth CRE)

The QMPQC collaborates with the Stillbirth CRE in promoting best practice and raising community awareness around the prevention of stillbirth and care for families whose child is stillborn. The Safer Baby Bundle was implemented statewide at enrolled sites by Clinical Excellence Queensland (CEQ) throughout 2020 and 2021. Safer Baby Bundle – preventing stillbirth across Australia – is an initiative developed by the NHMRC Centre in the Stillbirth CRE, in collaboration with maternity professionals, state health bodies and bereaved parents. The aim is to reduce the rate of stillbirth after 28 weeks gestation by 20 percent by the year 2023.

The Bundle is a collection of interventions designed to reduce late pregnancy stillbirth. Its development has drawn from the expertise of the UK Saving Babies Lives Bundle of Care, which saw a 20 percent reduction in stillbirth rates following implementation in the United Kingdom and individually, Scotland. Resources include eLearning modules for clinicians and information for pregnant women and their families, aimed at bridging the gap between best practice clinical evidence and maternity service provision across Australia.

Safer Baby Bundle
WORKING TOGETHER TO REDUCE STILLBIRTH

For further information about the Safer Baby Bundle in Queensland, please contact SaferBabyBundle@health.Queensland.gov.au

For further information about the Stillbirth CRE, please contact Stillbirthcre@mater.uq.edu.au

Ministerial Rural Maternity Taskforce

The Rural Maternity Taskforce was established in August 2018 to advise the Minister for Health and Ambulance Services on the status of rural maternity services in Queensland, with a focus on safety and access. The Taskforce included rural consumers, front-line clinicians, Aboriginal and Torres Strait Islander organisations, professional organisations and unions, researchers, policy makers and health service leaders.

For information on the Taskforce findings and recommendations, please refer to https://clinicalexcellence.qld.gov.au/sites/default/files/docs/maternity/rural-maternity-taskforce-report.pdf

Appendices

Appendix A

Abbreviations

ABS	Australian Bureau of Statistics
ACM	Australian College of Midwives
AIHW	Australian Institute of Health and Welfare
Apgar	**a**ppearance, **p**ulse, **g**rimace response to foot stimulation, **a**ctivity and **r**espiration
APH	antepartum haemorrhage
APMCAT	Australian Perinatal Mortality Clinical Audit Tool
ART	assisted reproductive technology
BMI	body mass index
CALF	Congenital Anomaly Linked File
CASC	Congenital Anomalies Sub-Committee
CDB	Communicable Diseases Branch
CEQ	Clinical Excellence Queensland
cCHD	critical Congenital Heart Defect
CHD	Congenital Heart Defect
CI	Confidence Interval
COPE	Centre of Perinatal Excellence
CPAP	continuous positive airway pressure
CRE	Centre of Research Excellence (Stillbirth)
CS	caesarean section
CSCF	Clinical Services Capability Framework
CSWG	Congenital Syphilis Working Group
CTPA	computed tomographic pulmonary angiography
DFM	decreased fetal movements
FGR	fetal growth restriction
GDM	gestational diabetes mellitus
GP	General Practitioner
HEAPS	Human Error and Patient Safety
HHS	Hospital and Health Service
ICD-9-CM	The International Classification of Diseases, Ninth Revision, Clinical Modification
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
ieMR	integrated electronic Medical Record
IMPROVE	IMproving Perinatal Review and Outcomes Via Education
IPPV-ETT	Intermittent positive-pressure ventilation – Endotracheal tube
LBW	low birth weight
LOS	length of stay

LUSCS	lower uterine segment caesarean section
MHAOD	Mental Health Alcohol and Other Drugs
MMR	maternal mortality ratio
MMSC	Maternal Mortality Sub-Committee
NDC	Neonatal Death Classification
NHMRC	National Health and Medical Research Council
NTD	neural tube defects
OECD	Organisation for Economic Co-operation and Development
PCR	polymerase chain reaction
PE	pulmonary embolism
PDC	Perinatal Death Classification
PHR	Pregnancy handheld record
PMMRC	Perinatal and Maternal Mortality Review Committee
PMSC	Perinatal Mortality Sub-Committee
PSANZ	Perinatal Society of Australia and New Zealand
PSANZ-NDC	Perinatal Society of Australia and New Zealand Neonatal Death Classification
PSANZ-PDC	Perinatal Society of Australia and New Zealand Perinatal Death Classification
PTSD	post-traumatic stress disorder
QHAPDC	Queensland Hospital Admitted Patient Data Collection
QMNCN	Queensland Maternity and Neonatal Clinical Network
QMPQC	Queensland Maternal and Perinatal Quality Council
QPDC	Queensland Perinatal Data Collection
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RCA	Root Cause Analysis
ROM	rupture of membrane
RPR	rapid plasma reagin
SEIFA	Socio-Economic Indexes for Areas
SES	socioeconomic status
SEQ	South-East Queensland
SGA	small for gestational age
SROM	spontaneous rupture of membranes
ToP	termination of pregnancy
VTE	Venous thromboembolism
WHO	World Health Organization

Appendix B

Data sources used in this report

This report is based on the:

- Queensland Perinatal Data Collection
- Queensland Hospital Admitted Patient Data Collection
- Queensland Death Registrations and Master Linkage File data.

It relates primarily to the two calendar years 2018 and 2019. Trend analysis is based on data for a 10-year period (from 2010), unless otherwise noted. Data are accurate at time of publication, although subsequent changes to the perinatal data collection may occur.

Appendix C

Membership of the Queensland Maternal and Perinatal Quality Council, 2020 – 2021

Membership	Position
Professor Leonie Callaway (Co-Chair)	Director of Research, Women's and Newborn Services; Royal Brisbane and Women's Hospital and Executive Director of the Women's and Children's Stream, Metro North Hospital and Health Service
Professor Ted Weaver (Co-Chair)	Senior Medical Officer, Obstetrics and Gynaecology, Sunshine Coast Hospital and Health Service; Clinical sub-Dean, Griffith University School of Medicine
Professor Vicki Flenady	Director, Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland
Professor Tim Donovan	Neonatal Medicine and Consultant Neonatology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Ms Joanne Ellerington	Manager, Data Collections – QHAPDC and QPDC, Statistical Collections and Integration Unit, Statistical Services Branch, Queensland Health
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Unit, Statistical Services Branch, Queensland Health
Dr Nikki Whelan	Consultant Obstetrician and Gynaecologist
Dr Diane Payton	Anatomical Pathologist, Pathology Queensland
Dr Simon Maffey	Deputy Director, Obstetric Anaesthesia, Department of Anaesthesia, Mater Health Services, Brisbane
Dr Helen Barrett	Director of Endocrinology, Mater Health Services, Brisbane
Dr Paul Bretz	Director, Obstetrics and Gynaecology, Mater Health Services, Brisbane
Ms Anne Bousfield	Clinical Midwifery Consultant, Roma Hospital, South West Hospital and Health Service
Dr Pauline McGrath	Senior Genetic Counsellor, Genetic Health Queensland
Mr Christopher Junge	Private Hospitals Association of Queensland representative, Director of Clinical Services, St Andrew's Private Hospital, Ipswich
Dr Benjamin Bopp	Director of Obstetrics and Gynaecology, Gold Coast University Hospital
Dr Melissa Cairns	General Practitioner/GP Liaison Officer, Metro North Hospital and Health Service and Brisbane North Primary Health Network
Dr John Clift	Senior Medical Officer, Anaesthesia, Rockhampton Hospital
Dr Lucy Cooke	Neonatologist and Medical Director, Neonatal Retrieval Service – Southern and Central Queensland and Northern New South Wales
Dr Shahida Rehman	Specialist, Obstetrics and Gynaecology, Caboolture Hospital
Dr Fiona Britten	Endocrinologist and Obstetric Physician, Royal Brisbane and Women's Hospital
Dr Johanna Laporte	Maternal Fetal Medicine Specialist, Royal Brisbane and Women's Hospital

Membership	Position
Dr Jessica Gaughan	Rural Generalist (Obstetrician and Gynaecologist)/Senior Medical Officer, Emerald Hospital
Dr Elisabeth Hoehn	Medical Director, Queensland Centre for Perinatal and Infant Mental Health, Child and Youth Mental Health Service, Children's Health Queensland
Sherry Holzapfel	Indigenous midwife and Director, Aboriginal and Torres Strait Islander Health Unit, Metro North Hospital and Health Service
Tionie Newth	Maternal Fetal Medicine, Clinical Midwife Consultant/Midwifery Navigator
Marcia Morris	Assistant Nursing and Midwifery Director, ieMR implementation Lead – Maternity
Libby Morton	Program Manager, Queensland Centre for Perinatal and Infant Mental Health, Child and Youth Mental Health Service, Children's Health Queensland
Ms Marce Green	Consumer Representative
Dr Rebecca Jenkinson	Consumer Representative
Associate Professor Rebecca Kimble	ex-officio as Chair, Statewide Maternity and Neonatal Clinical Network
Professor Julie McEniery	ex-officio as Chair, Queensland Paediatric Quality Council
Dr Jocelyn Toohill	Director of Midwifery, Office of the Chief Nursing and Midwifery Officer, Clinical Excellence Queensland
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat
Andrea Chitakis	QMPQC Co-ordinator and Secretariat (2010–2021)

Perinatal Mortality Sub-Committee

Membership	Position
Dr Johanna Laporte (Chair)	Maternal Fetal Medicine Specialist, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Professor Vicki Flenady	Director, Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland
Dr Nikki Whelan	Private Consultant Obstetrician and Gynaecologist
Professor Ted Weaver	Senior Medical Officer, Obstetrics and Gynaecology, Sunshine Coast Hospital and Health Service; Clinical sub-Dean, Griffith University School of Medicine
Joanne Ellerington	Manager, Data Collections – QHAPDC and QPDC, Statistical Collections and Integration Unit, Statistical Services Branch, Queensland Health
Anne Bousfield	Clinical Midwifery Consultant, Roma Hospital, South West Hospital and Health Service
Deborah Birthisel	Clinical Midwife, Birth Suite, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland, Health Support Queensland
Teresa Walsh	Director and Midwife, New Life Midwifery Pty Ltd
Professor Helen Liley	Senior Staff Specialist, Neonatology, Mater Health Services
Dr Richard Mausling	Staff Specialist, Neonatology, Mater Health Services
Leah Hardiman	Consumer Representative
Dr Admire Matsika	Specialist Consultant Anatomical Pathologist, Mater Pathology
Professor Sailesh Kumar	Maternal Fetal Medicine Specialist, Mater Health Services
Bree Lowing	Clinical Midwife, Maternal Fetal Medicine, Gold Coast University Hospital
Catherine Kilgour	Lecturer (Teaching and Research) School of Nursing, Midwifery and Social Work, The University of Queensland Midwife/Registered Nurse, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Christoph Lehner	Consultant Obstetrician, Fellow in Maternal Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Janet Sharpe	Staff Specialist Neonatologist, Sunshine Coast Hospital and Health Service
Tionie Newth	Research Midwife, NHMRC Centre of Research Excellence in Stillbirth (Stillbirth CRE) Mater Health Services
Dr Poliana De Barros Medeiros	Neonatologist, NHMRC Centre of Research Excellence in Stillbirth (Stillbirth CRE) Mater Health Services
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Unit, Statistical Services Branch, Queensland Health
Azure Rigney	Consumer Representative
Imogen Kettle	Clinical Midwife Consultant – QMPQC Projects
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat
Andrea Chitakis	QMPQC Co-ordinator and Secretariat (2010–2021)

Maternal Mortality Sub-Committee

Membership	Position
Dr Nikki Whelan (Chair)	Private Consultant Obstetrician and Gynaecologist
Professor Leonie Callaway	Director of Research, Women's and Newborn Services; Royal Brisbane and Women's Hospital and Executive Director of the Women's and Children's Stream, Metro North Hospital and Health Service
Libby Morton	Program Manager, Queensland Centre for Perinatal and Infant Mental Health, Children's Health Queensland
Professor Ted Weaver	Senior Medical Officer, Obstetrics and Gynaecology, Sunshine Coast Hospital and Health Service; Clinical sub-Dean, Griffith University School of Medicine
Dr Simon Maffey	Deputy Director, Obstetric Anaesthesia, Department of Anaesthesia, Mater Health Services, Brisbane
Dr William Parsonage	Staff Specialist, Cardiology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Anne Bousfield	Clinical Midwifery Consultant, Roma Hospital, South West Hospital and Health Service
Dr Rebecca Williams	Forensic Pathologist, Forensic and Scientific Services, Health Support Queensland
Dr Susan Roberts	Clinical Lead, Lavender Mother and Baby Unit, Perinatal Psychiatrist, Gold Coast University Hospital, Gold Coast Hospital and Health Service
Dr Fiona Britten	Endocrinologist and Obstetric Physician, Royal Brisbane and Women's Hospital
Dr Melissa Cairns	General Practitioner/GP Liaison Officer, Metro North Hospital and Health Service and Brisbane North Primary Health Network
Dr John Clift	Senior Medical Officer, Anaesthesia, Rockhampton Hospital
Dr Catherine Rawlinson	Service Development Leader, Queensland Centre for Perinatal and Infant Mental Health, Nundah Mental Health
Dr Thangeswaran Rudra	Senior Consultant, Obstetrics and Gynaecology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Sherry Holzapfel	Indigenous midwife and Director, Aboriginal and Torres Strait Islander Health Unit, Metro North Hospital and Health Service
Dr Yogesh Chadha	Senior Staff Specialist, Obstetrics and Gynaecology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Caitlin Modini	Medical student
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat
Andrea Chitakis	QMPQC Co-ordinator and Secretariat (2010–2021)

Congenital Anomaly Sub-Committee

Membership	Position
Professor Tim Donovan (Chair)	Neonatal Medicine and Consultant Neonatology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Paul Bretz	Director, Obstetrics and Gynaecology, Mater Health Services, Brisbane
Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland, Health Support Queensland
Associate Professor Julie McGaughran	Director, Genetic Health Queensland
Dr Renuka Sekar	Clinical Lead, Maternal and Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Unit, Statistical Services Branch, Queensland Health
Melanie McKenzie	Consumer representative, Director and Founder of Harrison's Little Wings
Associate Professor Julie McEniery	ex-officio as Chair, Queensland Paediatric Quality Council
Dr Pauline McGrath	Senior Genetic Counsellor, Genetic Health Queensland
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat
Andrea Chitakis	QMPQC Co-ordinator and Secretariat (2010–2021)

Congenital Syphilis Working Group

Membership	Position
Professor Leonie Callaway (Co-Chair)	Director of Research, Women's and Newborn Services; Royal Brisbane and Women's Hospital and Executive Director of the Women's and Children's Stream, Metro North Hospital and Health Service
Dr Helen Pedgrift	A/Public Health Medical Officer, Sexual Health Tropical Public Health Service Cairns and Hinterland Hospital and Health Service
Professor Clare Nourse	Paediatric Infection Specialist, Infection Management and Prevention Services, Children's Health Queensland Faculty of Medicine, University of Queensland
Dr Sumi Britton	Staff Specialist, Infectious Diseases, Royal Brisbane and Women's Hospital
Catherine Spucches	Principal Public Health Officer, Sexually Transmitted Infections Team, Communicable Diseases Branch
Dr Renuka Sekar	Clinical Lead, Maternal and Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Alison Thompson	Manger Blood Borne viruses and Sexually Transmitted Diseases, Communicable Diseases Branch
Dr Diane Rowling	Senior Medical Officer, Metro North Public Health Unit
Emma Sanguineti	Senior Epidemiologist, Communicable Diseases Branch
Dr Jacqueline Mein	A/Public Health Medical Officer, Sexual Health Tropical Public Health Service Cairns and Hinterland Hospital and Health Service
Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland, Health Support Queensland
Professor Paul Colditz (Co-Chair)	Neonatologist, Director, Perinatal Research Centre and Head of School of Clinical Medicine, The University of Queensland
Dr Mandy Seel (Co-Chair)	Public Health Physician – Sexual Health, Public Health Unit, Metro North Hospital and Health Service
Dr Annie Preston-Thomas	Public Health Medical Officer – Sexual Health Tropical Public Health Services, Cairns and Hinterland Hospital and Health Service
Professor Vicki Flenady	Director, Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat
Andrea Chitakis	QMPQC Co-ordinator and Secretariat (2010–2021)

Perinatal Mortality Contributing Factors Case Review Panel

Membership	Position
Professor Vicki Flenady (Co-Chair)	Director, Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland
Dr Johanna Laporte (Co-Chair)	Maternal Fetal Medicine Specialist, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland, Health Support Queensland
Deborah Birthisel	Clinical Midwife, Birth Suite, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Professor Timothy Donovan	Neonatal Medicine and Consultant Neonatology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Christoph Lehner	Registrar, Maternal Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Bree Lowing	Clinical Midwife, Maternal Fetal Medicine, Gold Coast University Hospital
Dr Admire Matsika	Specialist Consultant Anatomical Pathologist, Mater Pathology
Teresa Walsh	Director and Midwife, New Life Midwifery Pty Ltd
Leah Hardiman	Consumer representative
Dr Nikki Whelan	Private Consultant Obstetrician and Gynaecologist
Imogen Kettle	Clinical Midwife Consultant – perinatal mortality case information management
Dr Janet Sharpe	Staff Specialist Neonatologist, Sunshine Coast Hospital and Health Service
Tionie Newth	Research Midwife, NHMRC Centre of Research Excellence in Stillbirth (Stillbirth CRE) Mater Health Services
Dr Poliana De Barros Medeiros	Neonatologist, NHMRC Centre of Research Excellence in Stillbirth (Stillbirth CRE) Mater Health Services

Appendix D

IMPROVE program

The Perinatal Society of Australia and New Zealand (PSANZ) has developed Clinical Practice Guidelines for Perinatal Mortality to improve standards in clinical practice around the time of a perinatal death and partners with the Stillbirth CRE to maintain and disseminate the guidelines. The IMPROVE (IMproving Perinatal Review and Outcomes via Education) program has been developed for maternity health care professionals to enhance the uptake of these guidelines. IMPROVE utilises the Structured, Clinical, Objective, Referenced, Problem-orientated, Integrated and Organised (SCORPIO) educational model designed for skills training[79] which involves small groups of learners rotating around six interactive learning stations that are each facilitated by an experienced educator.

IMPROVE involves: 1) a short introductory lecture; 2) six learning stations; and 3) formative assessment. The learning stations:

1. Communicating with parents about perinatal autopsy
2. Autopsy and placental examination
3. Investigation of perinatal deaths
4. Examination of babies who die in the perinatal period
5. Audit and classification of perinatal deaths
6. Psychological and social aspects of perinatal bereavement

Who should attend?

The workshops are designed for health care professionals including obstetricians, midwives, neonatal nurses, neonatologists, pathologists, bereavement specialists, social workers, or those interested from a policy or public health perspective. IMPROVE workshops provide an opportunity for participants to understand the PSANZ Perinatal Mortality Guidelines in an interactive way.

IMPROVE program materials

A booklet of program materials is provided for each participant covering key aspects of the PSANZ Guidelines and other relevant documentation specific to that region. A certificate of completion is provided at the end of the IMPROVE program.

This activity is endorsed with four MidPlus points from the Australian College of Midwives. Eligible fellows of RANZCOG can claim five CPD points in the Clinical Expertise domain.

IMPROVE eLearning

The IMPROVE eLearning module has been developed and formally launched in 2020. The eLearning module covers similar content to the face to face workshop, in an interactive way that users can complete at their own pace.

The workshop has been accredited by Australian College of Midwives, RANZCOG and Australian College of Rural and Remote Medicine, with CPD points available upon successful completion.

The eLearning module can be accessed here: https://learn.stillbirthcre.org.au

For further information contact Tionie Newth – National Coordinator; tionie.newth@mater.uq.edu.au

To arrange an IMPROVE workshop, please contact the IMPROVE Team

Telephone: 07 3163 3829
Email: improve@mater.uq.edu.au

For further information about upcoming workshops or if you would like to arrange a workshop contact Stillbirth CRE team; improve@mater.uq.edu.au

The eLearning module can be accessed here; https://learn.stillbirthcre.org.au

79 Gardiner P, Kent A, Flenady V et al. IMproving Perinatal Mortality Review and Outcomes Via Education; An educational program for health care professionals on best practice around the time of a perinatal death. BMC Pregnancy Childbirth. 2016 Nov 25;16(1):376

Appendix E

Classification of mortality contributing factors

Perinatal mortality case review findings are classified against the AIHW requirement option as recommended in the PSANZ Clinical Guideline[67]:

- Substandard factor(s) identified but unlikely to have contributed to outcome (insignificant)
- Substandard factor(s) identified but might have contributed to outcome (possible)
- Substandard factor(s) identified likely to have contributed to outcome (significant)
- No substandard care factors identified
- Contributing factor assessment not undertaken.

This follows the recommendations in the PSANZ Clinical Practice Guidelines on Care around Stillbirth and Neonatal Death[67]. Furthermore, the PSANZ Guidelines recommend categorisation of substandard factors for perinatal deaths by type of factor, using the Australian Perinatal Mortality Clinical Audit Tool[80].

Were factors relating to organisational and/or management identified? (for example, inadequate supervision of staff, lack of appropriate clinical management protocols, lack of communication between services. If yes, please specify each question based on the following rates:

1. Insignificant. Sub-standard factors identified but unlikely to have contributed to the outcome
2. Possible. Sub-standard factors identified might have contributed to the outcome
3. Significant. Sub-standard factors identified were likely to have contributed to the outcome
4 Undetermined. Insufficient information available
5. Unknown.

Please state the specific factors and include any relevant comments.

Poor organisational arrangements of staff
Inadequate education and training
Lack of policies, protocols or guidelines
Inadequate numbers of staff
Poor access to senior clinical staff
Failure or delay in emergency response
Delay in procedure (for example, caesarean section)
Inadequate systems/process for sharing of clinical information between services
Delayed access to test results or inaccurate results
Equipment (for example, faulty equipment, inadequate maintenance or lack of equipment)
Building and design functionality (for example, space, privacy, ease of access, lighting, noise, power failure, operating theatre in distant location)
Other reason/unknown

80 PSANZ Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Appendix E – Australian Perinatal Mortality Clinical Audit Tool. Page 31.

Were factors relating to personnel identified? (staff factors relating to professional care and service provision). If yes, please specify as per options 1–5 above.
Knowledge and skills of staff were lacking
Delayed emergency response by staff
Failure to maintain competence
Communication between staff was inadequate
Failure to seek help/supervision
Failure to follow recommended best practice
Lack of recognition of complexity or seriousness or condition by care giver
Other reason/unknown
Were barriers to accessing/engaging with care identified? (for example, no; infrequent or late booking for antenatal care; woman declined treatment/advice)
No antenatal care
Infrequent or late booking
Declined treatment or advice
Obesity impacted on delivery of optimal care (for example, USS)
Substance use
Family violence
Lack of recognition by the woman or family of complexity of seriousness of condition
Maternal mental illness
Cultural barriers
Language barriers
Not eligible to access free care
Environmental (for example, isolated, long transfer, weather prevented transport)
Other reason/unknown

Appendix F

Queensland Maternity and Neonatal Clinical Network and Queensland Clinical Guidelines

The primary objectives of Queensland Clinical Guidelines (QCG) are to provide clinical guidance informed by contemporary evidence, and to minimise inappropriate variation in clinical care. QCG has become a 'source of truth' for many associated and complimentary Queensland Health maternity documents and resources including, the Pregnancy Health Record, ieMR, statewide clinical forms and local HHS policy and procedures.

QCG was established by Queensland clinicians in 2008 and works in close partnership with both the QMNCN and the QMPQC. The guidelines and resources are a valuable support to the QMPQC in improving the safety and quality of maternity and neonatal care in Queensland. Recent cooperation includes inclusion of QMPQC recommendations into the QCG Newborn assessment (routine) guideline for pulse oximetry screening and newborn bloodspot testing (NBST).

QCG has established an effective methodology for developing clinical guidelines and is progressively expanding into areas beyond the foundational maternity and neonatal disciplines. Recent collaborations have included Safer infant sleeping with the Paediatric Quality Council, and Rheumatic heart disease and pregnancy with the Queensland Aboriginal and Torres Strait Islander Rheumatic Heart Disease Action Plan 2018–2021 group.

Currently there are 45 maternity and neonatal guidelines, and 78 neonatal medicine monographs (NeoMedQ) available on the QCG website. Each guideline is accompanied by implementation resources including a guideline supplement, education presentation, knowledge assessment and consumer information.

The QCG website continues to attract a high number of visits and downloads. There has been a surge in access during the COVID-19 pandemic with 9 versions of the Maternity care for mothers and babies during the COVID-19 pandemic guideline published since March 2020.

Guidelines, implementation resources and the NeoMedQ can be accessed at https://www.health.Queensland.gov.au/qcg

Appendix G

Table of outcomes from QMPQC 2019 Report

Queensland Maternal and Perinatal Quality Council – 2019 Report – Action Plan			
Recommendation	Suggested action/area responsible	Action	Response
That Queensland Health develop strategies to improve access to culturally safe antenatal care, to increase early engagement and frequency of attendance by Indigenous women. (see page 15)	Correspondence forwarded to the Queensland Health, Deputy Director-General, Aboriginal and Torres Strait Islander Health Division, Chair, Statewide Maternity and Neonatal Clinical Network and Executive Director Patient Safety and Quality for consideration.	Letter sent	Discussions held with Deputy Director General Aboriginal and Torres Strait Islander Health Division
That all fetal ultrasound screen providers receive training around, and utilise, published guidelines for standard fetal cardiac views, particularly of ventricular outflow tracts as noted in the International Society of Ultrasound in Obstetrics and Gynaecology Fetal Cardiology Guidelines. (see page 38)	Correspondence forwarded to Australian Society of Ultrasound Medicine (ASUM) and the Royal Australian and New Zealand College of Radiologists (RANZCR) for consideration.	Letters sent	Nil response to date
That consideration be given by each birth hospital for all newborn infants to have pulse oximetry screening (POS) prior to discharge, as stated in the Queensland Maternity and Neonatal Clinical Guidelines 2019. (see page 38)	Correspondence forwarded all public and private health services for consideration once the QMPQC Congenital Anomaly neoPOS working group has developed a recommended standard POS protocol, endorsed by the QMPQC and QMNCN.	Letters sent	Inclusion in Maternity and Neonatal Clinical Guideline – Newborn baby assessment (routine) Pulse Oximetry Screening
That all Queensland Hospital and Health Services use the 'single pack' perinatal and fetal autopsy consent form. (see page 39)	Correspondence forwarded to General Manager, Pathology Queensland suggesting that Pathology Queensland consider only accepting the 'single pack' perinatal and fetal autopsy consent form from a set date and notifying health services of this change. Refer to Patient Safety and Quality for assistance in removing all existing perinatal autopsy consent and clinical summary forms from QHEPS.	Letters sent	Condensed 9 page 'Single Pack' Perinatal and Fetal Autopsy consent, Perinatal and Fetal Autopsy Clinical Summary and Perinatal and Fetal Autopsy Information for families about non-coronial autopsy added to the Queensland Health webpage 14 Dec 2022
That consideration be given to the promotion of education regarding the new Medicare numbers for screening for perinatal mental health in the private sector, including increasing awareness of local referral pathways. (see page 46)	Correspondence forwarded to Chairman. Centre for Perinatal Excellence and to the Director of Clinical Services in each private maternity service seeking assistance in promoting the new Medicare numbers for screening for perinatal mental health, including increasing awareness of local referral pathways.	Letter sent	COPE – responsible for the development and implementation of its digital platform (iCOPE) which is available to the public maternity and postnatal sectors (free of charge, funded by the Commonwealth pending State Government approval to implement)

Queensland Maternal and Perinatal Quality Council – 2019 Report – Action Plan			
Recommendation	Suggested action/area responsible	Action	Response
That consideration be given to prioritising the development of a Queensland clinical guideline on perinatal mental health. (see page 47)	Correspondence forwarded to the Director, Queensland Clinical Guidelines (QCG) for consideration.	Email sent	Nil response to date
That consideration be given to the development of a systematic, holistic approach to appropriate high intensity intervention, including case management with a continuity of care midwifery model, for women who are at risk of disengaging from antenatal care and who may have complex mental health/psychosocial issues. (see page 48)	Correspondence forwarded to the Statewide Maternity and Neonatal Clinical Network for consideration in consultation with Mental Health, Alcohol and Other Drugs Branch and the Office of the Chief Nurse and Midwifery Officer.	Memo sent	PSQIS CEQ Initiated Perinatal Maternal Mental Health Forum
That State and Federal jurisdictions improve education and rapid access to safe reliable contraception for women. This should preferably occur through education for early secondary school students and a suitably targeted public health campaign. (see page 49)	Correspondence forwarded to the Queensland Health Director General for consideration re. directing to the Queensland Health Education Director General. Correspondence forwarded to the Chief Health Officer for consideration re. potential for the development of a public health campaign.	Letter sent	Partial response from the A/DDG-CHO October 2020
That culturally safe programs targeting education and provision of suitable contraception in Indigenous women be developed as a priority. (see page 49)	Correspondence forwarded to the Chief Health Officer and Deputy Director-General, Queensland Health, Aboriginal and Torres Strait Islander Health Division for consideration. and meeting held with DDG-ATSIHD Meeting July 2020.	Letters sent	Letter received of Acting Deputy Director General and Chief Health Officer outlining programs currently in operation
That priority be given to developing an ieMR solution that allows linking of mother and infant medical records. (see page 53)	Correspondence forwarded to Assistant Deputy Director-General and Chief Clinical Information Officer, Clinical Excellence Queensland for consideration.	Consultation with PSQIS Executive Director	
That an appropriate electronic solution to replace the functionality of a patient hand-held record, which can be shared between hospitals, midwives, general practitioners and women, be urgently prioritised. (see page 53)	Correspondence forwarded to Chief Clinical Information Officer, Clinical Excellence Queensland for consideration.	Letter sent	Nil response to date
That an autopsy, and where appropriate and available, molecular investigations, be performed in all cases of maternal mortality. Consideration should be given to amending the Queensland Coroners Act to include investigation of all maternal deaths (including late deaths) except where there is a clear and unequivocally diagnosed cause of death, for example, a known metastatic malignancy. (see page 54)	Correspondence forwarded to the General Manager, Pathology Queensland, seeking consideration and advice in relation to this recommendation. Correspondence forwarded, to the Queensland Attorney-General seeking support to review and amend the Queensland Coroners Act.	Letter sent Letter sent	Nil response to date Attorney-General noted the findings and recommendations of Report 2017, and requested the Department of Justice and Attorney-General's Office give further consideration to the request 2021

Queensland Maternal and Perinatal Quality Council – 2019 Report – Action Plan			
Recommendation	Suggested action/area responsible	Action	Response
That a systematic approach to reporting and reducing workplace intimidation, bullying, harassment and poor culture be developed for statewide implementation within all Queensland hospitals. (see page 55)	Correspondence forwarded to the Chief Executives of Hospital and Health Services and the co-Chairs of the HHS CEs Forum. Correspondence forwarded to statewide HHS HR Officers Group for consideration.	Letter sent Letter sent	Response received: • South West HHS • Mackay HHS Nil response to date
That Queensland Health consider designating appropriately resourced tertiary perinatal pathology centres, for the performing of perinatal and neonatal autopsy investigation by perinatal pathologists. This, together with appropriate staffing, to ensure timely high-quality investigation of stillbirths and neonatal deaths, is vital. (see page 67)	Correspondence forwarded to the DDG, Health Support Queensland.	Letter sent	Nil response to date
That all maternity hospitals have effective processes (e.g. via Perinatal and Maternal Mortality Review Committees) in place to ensure all perinatal deaths are appropriately investigated and classified according to the PSANZ national guidelines, for cause of death and contributing factors relating to care. (see page 69)	Correspondence forwarded to all Queensland Hospital and Health Services and private hospital maternity services.	Letters sent	Response received: • South West HHS • Mackay HHS
That all maternity services implement best practice care according to the Safer Baby Bundle. (see page 78)	Correspondence forwarded to all Queensland Hospital and Health Services (CEs) and private hospital maternity services.	Letters sent	Response received: • South West HHS • Mackay HHS • Central West HHS
That all maternity care providers undertake the Safer Baby Bundle online education program. (see page 78)	Correspondence forwarded to all Queensland Hospital and Health Services (CEs) and private hospital maternity services.	Letters sent	Response received: • South West HHS • Mackay HHS • Central West HHS
That the Queensland Department of Health review the temporary perinatal mortality Clinical Midwife Project Officer position, with a view to establishing it as a permanent resource allocated to the QMPQC.	Refer to the Executive Director, Patient Safety and Quality. Improvement Service, Clinical Excellence Queensland.	Enquiry made	

Queensland
Government