Maternal and Perinatal Death Review Committee

2020 Annual Report

Office of the Chief Coroner of Ontario
September 2022

Contents

This report was prepared by Dr. Louise McNaughton-Filion,
Chairperson of the Maternal and Perinatal Death Review Committee,
and Ms. Kathy Kerr – Executive Lead – Committee Management.

Message from the Chair

The Maternal and Perinatal Death Review Committee (MPDRC), together with its predecessor, the Obstetrical Care Review Committee, has been providing expert advice to coroner's investigations in Ontario since 1994.

The MPDRC reviews all maternal deaths in Ontario that are reported to the coroner system that occur during pregnancy, during delivery or immediately following delivery up to 42 days post-partum. Deaths after 42 days post-delivery are reviewed if there are concerns that the cause of death is directly related to the pregnancy or a complication of the pregnancy.

The committee also reviews stillbirths and perinatal deaths investigated by the Chief Coroner's Office where issues have been identified by the family, the investigating coroner or the Regional Supervising Coroner.

The MPDRC is comprised of well-respected and experienced experts representing the fields of obstetrics, maternal-fetal medicine, midwifery, perinatal nursing, obstetrical anesthesiology, pathology, neonatology, and family medicine. Representatives from the Society of Obstetricians and Gynaecologists of Canada have been instrumental in guiding the MPDRC on collaborative efforts to promote positive changes in obstetrics across not only Ontario, but also Canada.

Since its inception, the committee has reviewed a total of 487 cases and generated 834 recommendations towards the prevention of stillbirths and deaths involving mothers and neonates. In 2020, 23 cases were reviewed, and 39 recommendations were made. The top areas of concern identified in recommendations made in 2020 related to obstetrical care providers, transfer, communications/documentation, diagnosis/testing, policy/procedures, and education/training.

As we strive towards reducing similar deaths and improving the quality of care provided to mothers and infants, the identification of these trends will help guide the direction of future recommendations and prompt action by stakeholders within the obstetrical care community.

Copies of full, redacted reports are available to the public by contacting occ.inquiries@ontario.ca. It is the hope of this committee that these reports may be used to educate and help improve obstetrical care.

It is an honour to participate in the work of the MPDRC and I am grateful for the commitment of its members to the people of Ontario. As I became the Chair of this committee only at the end of 2020, the substantial contribution of Dr. Rick Mann who was the Chair of the MPDRC from 2011-2020 must be recognized. His work towards improving maternal and perinatal health over the years is much appreciated. I would like to acknowledge the assistance of Ms. Kathy Kerr, Executive Lead of the MPDRC. Without her organizational expertise the reviews and this report would not be possible.

It is my privilege to present to you the 2020 Annual report of the MPDRC.

Louise McNaughton-Filion, MD CCFP(EM), FCFP CCPE
Chair, Maternal and Perinatal Death Review Committee (MPDRC)
Regional Supervising Coroner
East Region – Ottawa Office

Committee membership (2020)

Dr. Jocelynn Cook
Society of Obstetricians and Gynaecologists of Canada – Chief Scientific Officer

Dr. Sharon Dore
Society of Obstetricians and Gynaecologists of Canada Representative

Dr. Michael Dunn
Neonatologist (Level 3)

Dr. Karen Fleming
Family Physician (Level 3)

Dr. Steven Halmo
Obstetrician (Level 2)

Ms. Susan Heideman
Perinatal Nurse

Dr. Robert Hutchison
Obstetrician (Level 3)

Dr. Sandra Katsiris
Anesthesiologist

Ms. Michelle Kryzanauskas
Midwife (Rural)

Dr. Dilipkumar Mehta
Neonatologist (Level 2)

Ms. Linda Moscovitch
Midwife (Urban)

Dr. Toby Rose
Forensic Pathologist

Dr. Gillian Yeates
Obstetrician (Level 1)

Dr. Rick Mann
Chairperson
Regional Supervising Coroner

Ms. Kathy Kerr
Executive Lead

Executive summary

- In 1994, the Office of the Chief Coroner established the Obstetrical Care Review Committee. In 2004, the name of the committee was changed to the Maternal and Perinatal Death Review Committee.

- The purpose of the MPDRC is to assist the Office of the Chief Coroner in the investigation, review and development of recommendations directed towards the prevention of future deaths relating to all maternal deaths (irrespective of cause) and stillbirths and neonatal deaths where the family, coroner or Regional Supervising Coroner have concerns about the care that the mother or child received.

- Since 2004, the MPDRC has reviewed 487 cases and generated 834 recommendations aimed towards the prevention of future deaths.

- On average, 29 cases are reviewed, and 49 recommendations are made each year by the MPDRC.

- The top areas of concern identified in recommendations made from 2004-2020 relate to: obstetrical care provider issues; policy and procedures; communications/documentation; and diagnosis and testing (including electronic fetal monitoring).

- In 2020, 23 cases were reviewed, and 39 recommendations were made. There were no cases involving COVID-19 reviewed by the MPDRC in 2020.

- Of the 23 cases reviewed in 2020, 12 were maternal (four executive reviews and eight full reviews), eight were neonatal and three were stillborn.

- Deaths involving women who were pregnant, but where the pregnancy did not cause or contribute to the death, are noted, and undergo an "executive" review. Maternal deaths involving a known complication of pregnancy (e.g., pulmonary embolism) *and* where there are no concerns regarding the care provided to the mother, may also undergo an executive review. The executive review is conducted by a core team of representatives of the MPDRC and includes an analysis of the circumstances surrounding the maternal death. The results of the review are discussed with the full committee for any additional investigation or comment.[1]

[1] Commencing in the 2017 Annual Report, executive reviews are included in the statistics for total number of reviews conducted.

Introduction

Purpose

In 1994, the Office of the Chief Coroner (OCC) established the Obstetrical Care Review Committee. In 2004, the name of the committee was changed to the Maternal and Perinatal Death Review Committee (MPDRC).

The purpose of the MPDRC is to assist the OCC in the investigation, review and development of recommendations directed towards the prevention of future similar deaths relating to all maternal deaths regardless of cause. This includes all deaths during pregnancy and the post-natal period (which is considered to be up to 42 days after delivery). Any deaths after 42 days and up to 365 days post-delivery are reviewed if the cause of death is directly related to the pregnancy or a complication of the pregnancy.

The committee reviews stillbirths and neonatal deaths where the family, coroner or Regional Supervising Coroner have concerns about the care that the mother or child received.

Findings of legal responsibility or conclusions of law are not permitted under the Coroners Act.

Definition of maternal deaths, stillbirths, perinatal and neonatal deaths

The MPDRC reviews the deaths of all women who died "during pregnancy and following pregnancy in circumstances that could reasonably be attributed to pregnancy." Deaths involving women who are pregnant, but where the death was not attributed to pregnancy are noted for statistical purposes and a condensed, executive review is conducted.

Maternal deaths are classified by the following criteria:

- Antepartum – during pregnancy
- Intrapartum - during delivery or immediately following delivery
- Postpartum - < 42 days after delivery

This committee does *not* review late maternal deaths occurring >42 days unless the cause of death is directly related to the pregnancy or a complication of the pregnancy.

Stillbirth is defined as the complete expulsion or extraction from the mother of a product of conception either after the 20th week of pregnancy or after the product of conception has attained the weight of 500 grams or more, and where after such expulsion or extraction there is no breathing, beating of the heart, pulsation of the umbilical cord or movement of voluntary muscle. (source: *Vital Statistics Act of Ontario*)

Perinatal deaths are defined as deaths during, at the time of, or shortly after birth, including home births.

Neonatal deaths are defined as deaths within the first seven days after birth.

Aims and objectives

1. To assist coroners in the Province of Ontario to investigate maternal and perinatal deaths and to make recommendations that may prevent deaths.
2. To provide expert review of the care provided to women during pregnancy, labour and delivery, and the care provided to women and newborns in the immediate postpartum period.
3. To provide expert review of the circumstances surrounding all maternal deaths in Ontario, in compliance with the recommendations of the Special Report on Maternal Mortality and Severe Morbidity in Canada. [2]
4. To inform doctors, midwives, nurses, institutions providing care to pregnant and postpartum women and newborns, and relevant agencies and ministries of government about hazardous practices and products identified during case reviews.
5. To produce an annual report that can be made available to doctors, nurses and midwives providing care to mothers and infants, and hospital departments of obstetrics, midwifery, radiology/ultrasound, anaesthesia and emergency for the purpose of preventing future deaths.
6. To help identify the presence or absence of systemic issues, problems, gaps, or shortcomings of each case to facilitate appropriate recommendations for prevention.
7. To help identify trends, risk factors, and patterns from the cases reviewed to make recommendations for effective intervention and prevention strategies.
8. To conduct and promote research where appropriate.
9. To stimulate educational activities through the recognition of systemic issues or problems and/or referral to appropriate agencies for action.
10. Where appropriate, to assist in the development of protocols with a view to prevention.
11. Where appropriate, to disseminate educational information.

Note: All of the above-described objectives and attendant committee activities are subject to the limitations imposed by the *Coroners Act of Ontario* and the *Freedom of Information and Protection of Privacy Act*.

Structure and size

The committee membership consists of respected practitioners in the fields of specialty including: obstetrics, family practice, specialty neonatology, maternal-fetal medicine, community pediatrics, pediatric and maternal pathology, anesthesiology, midwifery and obstetrical nursing. The membership is balanced to reflect wide and practicable geographical representation as well as representation from all levels of institutions providing obstetrical care including teaching centers to the extent possible. The chairperson will be a Deputy Chief Coroner or Regional Supervising Coroner or other person designated by the Chief Coroner.

Other individuals are invited to the committee meetings as necessary on a case by case basis (e.g. investigating coroner, Regional Supervising Coroner, other specialty practitioner relevant to the facts of the case, etc.).

[2] Special Report on Maternal Mortality and Severe Morbidity in Canada, Health Canada, 2004.

Methodology

Investigating coroners and Regional Supervising Coroners refer cases to the committee for review. At least one member of the committee reviews the information submitted by the coroner and then presents the case to the other members. After discussion by the committee, a final case report is written consisting of a summary of events, discussion and recommendations (if any), intended to prevent future deaths. The report is then sent to the referring Regional Supervising Coroner who may conduct further investigation (if necessary). Recommendations are distributed to agencies and organizations that may be in a position to have them implemented or considered. Organizations are asked to respond back within six months with the status of implementation of recommendations.

Where a case presents a potential or real conflict of interest for a committee member, the committee reviews the case in the absence of the member with the conflict.

When a case requires expertise from another discipline, an external expert reviews the case, attends the meeting, and participates in the discussion and drafting of recommendations, if necessary.

Limitations

This committee is advisory to the coroner system and will make recommendations to the Chief Coroner through the chairperson.

The consensus report of the committee is limited by the data provided. Efforts are made to obtain all relevant data.

The MPDRC case reports are prepared for the OCC and are therefore governed by the provisions of the *Coroners Act*, the *Vital Statistics Act,* the *Freedom of Information and Protection of Privacy Act* and the *Personal Health Information and Protection of Privacy Act.* Cases referenced in the annual report do not include identifying details.

It is important to acknowledge that these reports rely upon a review of the written records. The Coroner/Regional Supervising Coroner conducting the investigation may have received additional information that rendered one or more of the committee's conclusions invalid. Where a fact was made known to the chair of the committee prior to the production of the annual report, the case review was revised to reflect these findings.

Recommendations are made following a careful review of the circumstances of each death; they are not intended to be policy directives and should not be interpreted as such.

Responses received to recommendations are available to the public by contacting occ.inquires@ontario.ca.

This report of the activities and recommendations of the MPDRC is intended to provoke thought and stimulate discussion about obstetrical care and maternal and perinatal deaths in general in the province of Ontario.

Statistical overview (2004-2020)

The MPDRC (and previously the Obstetrical Care Review Committee) has generated recommendations since being established in 1994. Over time, not only has the committee evolved, but so too have medical technologies, policies, procedures, and public and professional attitudes towards maternal and perinatal care in the province. In order to provide an analysis that is reflective of more current values and attitudes, the statistical analysis contained within this annual report will focus on cases reviewed and recommendations made since 2004.

From 2004-2020, the MPDRC has reviewed a total of 487 cases. Of these cases, 184 (38%) were maternal, 206 (42%) were neonatal and 97 (20%) were stillbirths. These numbers reflect the policy of the OCC to review all maternal deaths. Commencing in 2015, deaths involving women who were pregnant, but where the pregnancy did not cause or contribute to the death, are noted and undergo an "executive" review. The executive review is conducted by a core team of representatives of the MPDRC and includes an analysis of the circumstances surrounding the maternal death. The results of the review are discussed with the full committee for any additional investigation or comment. If necessary and suggested by the broader committee, an executive review may result in a full review. The statistics below reflect the total number of reviews (i.e., executive and full), conducted by the MPDRC.

Neonatal and stillbirth reviews are conducted only when the family, investigating coroner or Regional Supervising Coroner have concerns about the care that the mother or child received.

The number of cases noted in **Chart One** is based on the year the case was reviewed, which, in many cases, is not the same year in which the death occurred.

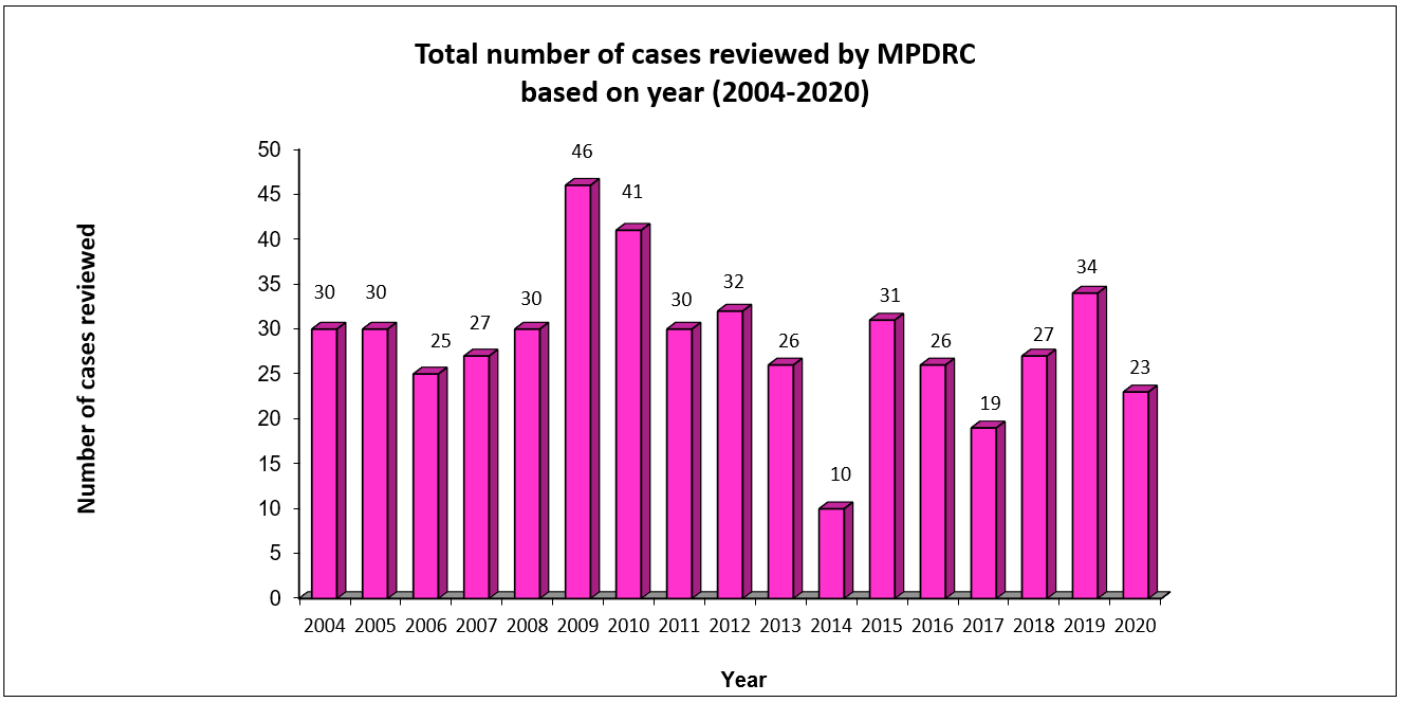
Chart one: MPDRC - # of cases reviewed (2004-2020)

Cases	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total	%	avg/yr
Total # of cases reviewed	**30**	**30**	**25**	**27**	**30**	**46**	**41**	**30**	**32**	**26**	**10**	**31**	**26**	**19**	**27**	**34**	**23**	**487**	*	**29**
Maternal - executive review	*	*	*	*	*	*	*	*	*	*	*	7	9	7	6	13	4	**46**	*	**8**
Maternal - full review	10	12	4	15	8	21	11	3	3	11	3	5	4	3	9	8	8	**138**	*	**8**
Maternal - total	10	12	4	15	8	21	11	3	3	11	3	12	13	10	15	21	12	**184**	**38%**	**11**
Neonatal	12	11	13	12	12	16	19	14	20	10	5	15	10	8	10	11	8	**206**	**42%**	**12**
Stillbirth	8	7	8	0	10	9	11	13	9	5	2	4	3	1	2	2	3	**97**	**20%**	**6**

***** Not applicable

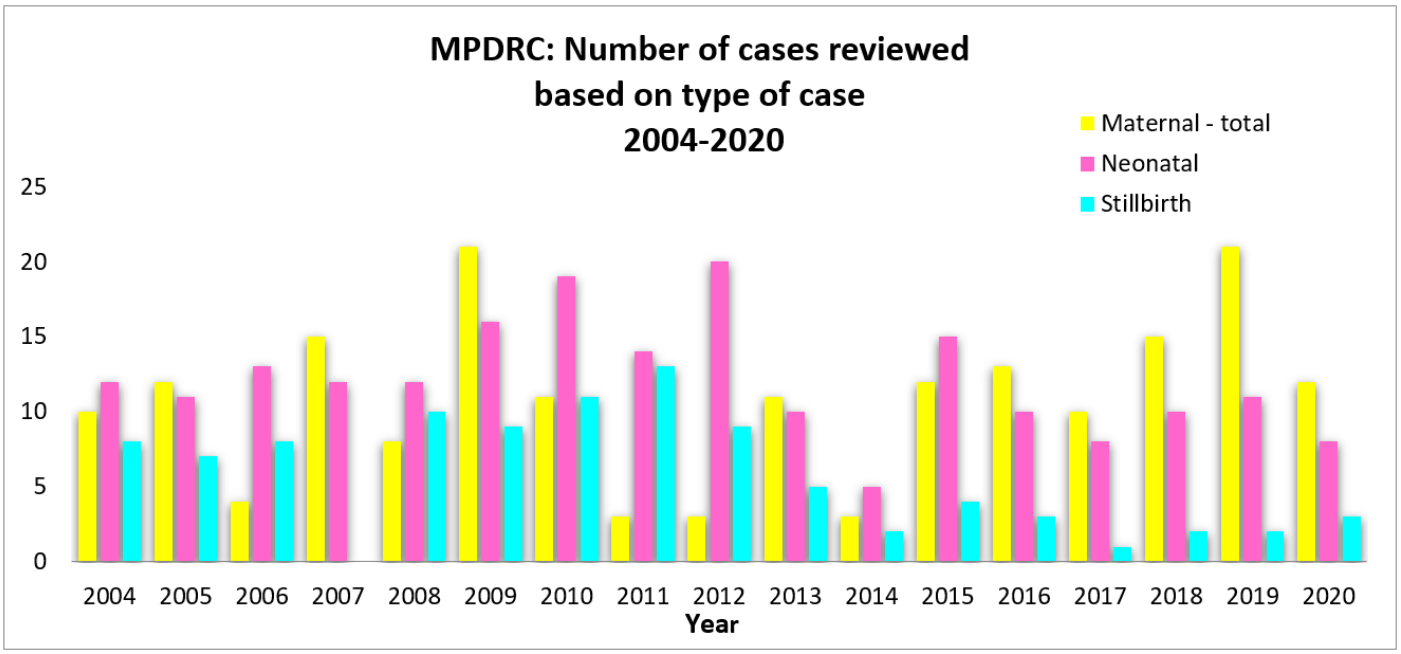
Chart One indicates that the total number of cases reviewed from 2004-2020 has varied from a low of 10 cases in 2014, to a high of 46 cases in 2009. This variance is likely reflective of committee administrative practices (e.g., time required for processing of review materials and compilation of final reports).

Graph one: Total number of cases reviewed by the MPDRC based on year (2004-2020)



Graph One demonstrates how the number of cases reviewed from 2004-2020 from a low of 10 in 2014, to a high of 46 in 2009. This variance is due to the subjective nature of referrals to the committee (i.e., only maternal deaths result in mandatory referrals and all others are at the discretion of the regional supervising coroner) and administrative issues. On average, the MPDRC reviews 29 cases per year.

Graph two: Number of cases reviewed based on type of case (2004-2020)



Graph Two demonstrates that, overall, from 2004-2020, the majority of cases reviewed are neonatal or maternal deaths. It is the policy of the Office of the Chief Coroner to review all maternal deaths in the province. Neonatal and stillbirth cases are reviewed when issues or concerns are identified.

Chart two: MPDRC - # of recommendations (2004-2020)

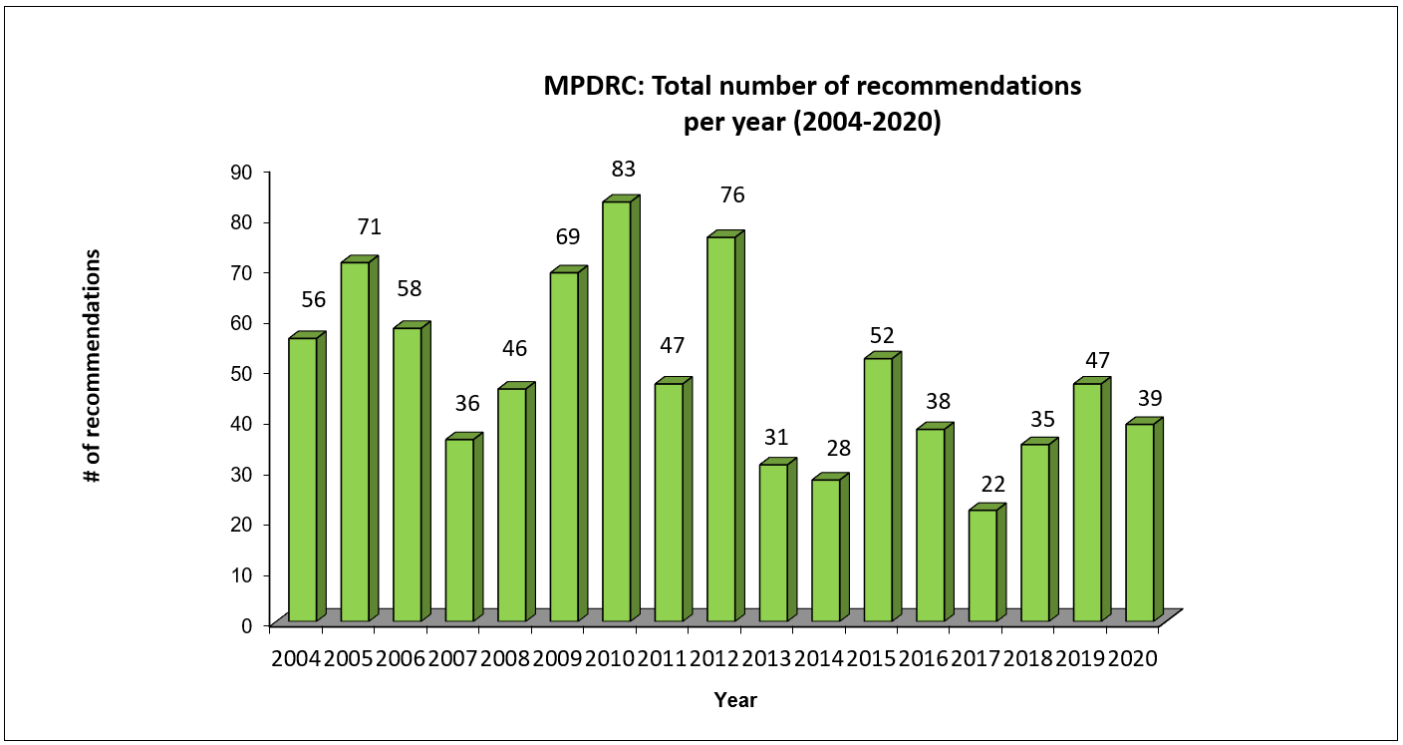
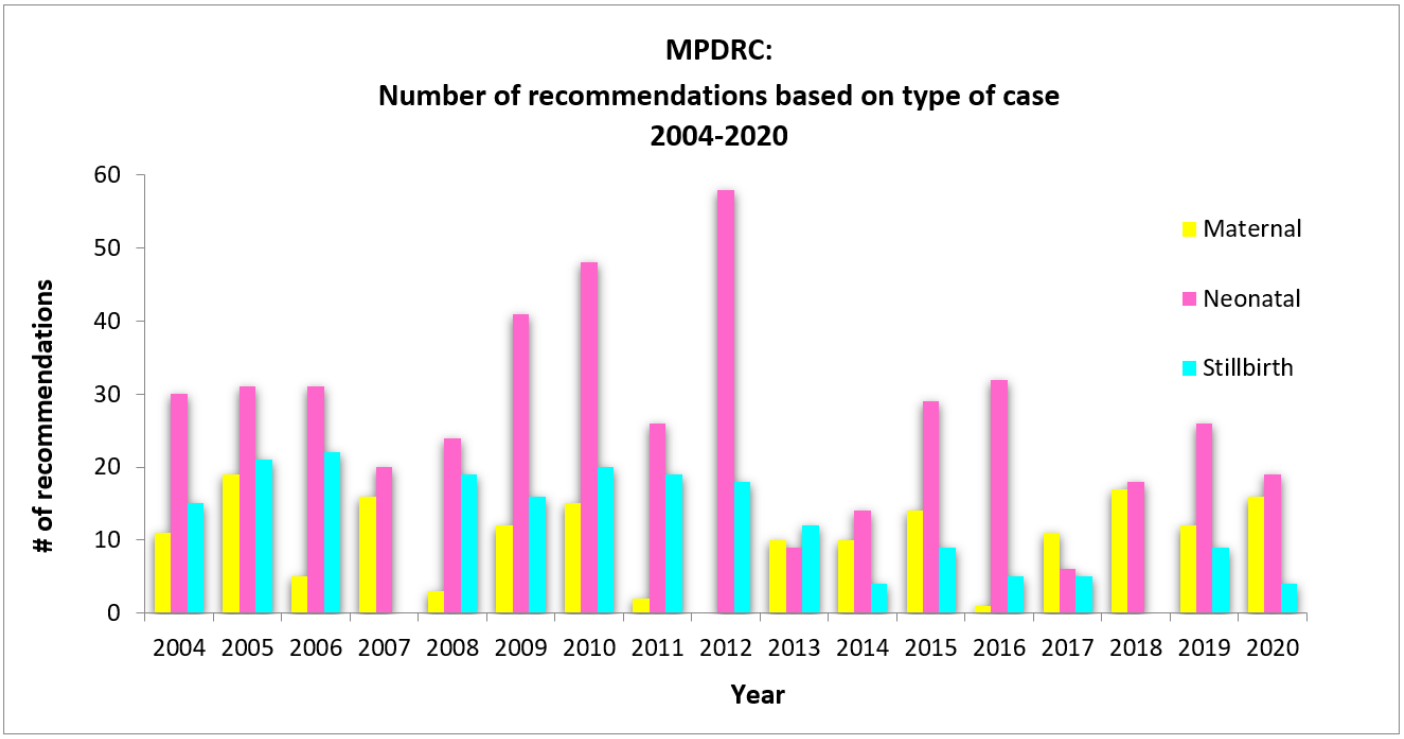


Chart Two indicates that the MPDRC has generated a total of 834 recommendations from 2004-2020. From this total, 174 (21%) were related to maternal cases, 462 (55%) from neonatal cases and 198 (24%) from stillbirth cases. Consistently over the years, the majority of cases and recommendations relate to reviews of neonatal deaths. On average, 49 recommendations are made per year.

Upon reviewing the recommendations that have been made, certain areas of concern have consistently emerged over time. The following general areas of concern have been identified:

- obstetrical care provider decisions
- policy and procedure (e.g., adherence or development of policy and procedures)
- communication/documentation (e.g., sharing and documenting information)
- quality (e.g., quality of care reviews)
- diagnosis and testing (e.g., interpretation of laboratory results)
- diagnosis and testing – specifically electronic fetal monitoring (EFM) (e.g., interpretation of results)
- education/training (e.g., continuing education)
- resources (e.g., access and allocation of resources)
- transfer (e.g., movement of patients)
- other (e.g., referral to another committee for review)

Graph three: Number of recommendations based on type of case 2004-2020



Graph Three demonstrates that from 2004-2020, most recommendations pertained to neonatal cases.

Chart three: MPDRC – Number and percentage of recommendations based on area of concern/theme and type of case (2004-2020)

	Maternal	Neonatal	Stillborn	Total	% of Total
Obstetrical care provider	69 37%	89 18%	47 23%	205	23%
Policy and procedure	33 18%	88 18%	35 17%	156	18%
Communications/documentation	18 10%	80 16%	37 18%	135	15%
Quality of Care	18 10%	42 9%	13 6%	73	8%
Diagnosis and testing	23 12%	69 14%	29 14%	121	14%
Diagnosis and testing - EFM	1 1%	52 11%	28 13%	81	9%
Education/Training	4 2%	29 6%	9 4%	42	5%
Resources	3 2%	15 3%	3 1%	21	4%
Transfer	8 4%	19 4%	5 2%	32	4%
Other	8 4%	3 0.6%	2 1%	13	1%

*Some recommendations touch on more than one theme.

Chart Three demonstrates that 23% of all recommendations made by the MPDRC from 2004-2020 relate to improving or addressing obstetrical care provider issues. An additional 18% of the recommendations pertain to the development of, or adherence to, policies and procedures and 15% to communication and/or documentation and in particular, the timely and accurate sharing of information between healthcare providers and with the patient.

Chart three also demonstrates the following key areas (based on type of case and theme):

- 18% of all recommendations from neonatal cases had an obstetrical care provider or policy and procedure theme, followed closely by 16% for communication and documentation
- 37% of all recommendations from maternal cases had the theme of obstetrical care provider (i.e., medical decisions)
- 23% of all recommendations from all cases had the theme of obstetrical care provider.

One area of specific concern that has been identified over the past few years relates to the use of electronic fetal monitoring (EFM) technology, how EFM results are interpreted by obstetrical care providers and what follow-up actions are taken in response to the findings. From 2004-2020, there have been 81 (9% of the total) recommendations made specifically pertaining to EFM.

Executive summary of cases reviewed in 2020

Cases reviewed by the MPDRC in 2020 may involve deaths that occurred in previous years.

Total number of cases reviewed (executive and full reviews): 23

Total number of recommendations: 39

Number of maternal full case reviews: 8

Number of maternal executive reviews*: 4

Number of recommendations from the maternal deaths reviewed: 16

Number of neonatal cases reviewed: 8

Number of recommendations from the neonatal deaths: 19

Number of stillborn cases reviewed: 4

Number of recommendations from the stillborn cases: 4

* Deaths involving women who are pregnant, but where the pregnancy did not cause or contribute to the death, are noted and undergo an “executive” review. The executive review is conducted by a core team of representatives of the MPDRC and includes an analysis of the circumstances surrounding the maternal death. The results of the review are discussed with the full committee for any additional investigation or comment.

A summary of all cases reviewed, and subsequent recommendations made in 2020, is included as Appendix A.

Lessons learned from MPDRC reviews

It would be remiss to not mention the impact of COVID-19 on the MPDRC and its reviews in 2020. The committee of maternal/perinatal experts quickly pivoted to a virtual format and for that we are grateful. Future reports will better define whether there are any recommendations arising from the COVID-19 pandemic, related to maternal and/or perinatal mortality.

The MPDRC has, through the course of its review process in 2020, identified issues related to maternal and perinatal care. The need for a maternal early obstetric warning system in all obstetrical care facilities, the importance of fetal monitoring, planning/preparing for obstetrical emergencies and maternal transport, the need for improved maternal morbidity and mortality data collection both provincially and federally and research on maternal death have been identified as important concerns. The need for robust review of adverse events by multidisciplinary teams at the local level was also identified. As we strive towards reducing similar deaths and improving the quality of care provided to mothers and infants, it is the goal of this committee that identification of these issues will help motivate positive change and prompt action by stakeholders in obstetrical care.

Thoughts from the Society of Obstetricians and Gynaecologists Of Canada (SOGC)

Prevention of Maternal Mortality: Canada's Toolkit for Confidential Enquiry
#savingmoms #savingbabies

Over the past four years, The Society of Obstetricians and Gynaecologists of Canada (SOGC) has been working with experts and partners to develop a system so that every maternal death in Canada is comprehensively reviewed and recommendations focused on prevention are created and implemented, in the context of Canada's healthcare system. The MPDRC is a key participant in this system.

At the same time, The Canadian Foundation for Women's Health, Canada's national not-for-profit fundraising foundation for women's sexual and reproductive health, launched a campaign to support research in the area of prevention of maternal mortality in Canada as well as implementation of the Confidential Enquiry system. Mr. Paul Carr spearheaded a campaign, catalyzed by his own personal donation of $100,000 in honour of his late wife, Kitty, to support research and implementation efforts toward prevention of maternal mortality in Canada. (https://cfwh.org/cfwh-awards-fellowships-and-grants/#carr). The first Kitty Carr Research Grant will be awarded in June 2022.

The goals of these efforts are to increase awareness of the issues surrounding pregnancy-related morbidities and deaths and to promote change among individuals, healthcare systems, and communities in order to avoid **every preventable case of morbidity and mortality and optimize outcomes for women and babies**. Confidential Enquiry systems have been well-established in other countries and have led to reductions in maternal deaths, and improved outcomes for women, care providers and systems of care.

To facilitate implementation of a standardized approach to reviewing maternal morbidities and mortalities and to providing recommendations for prevention, a toolkit has been developed by Canadian experts, led by the SOGC and members of the Nova Scotia, Ontario, Alberta and British Columbia's perinatal data/maternal

morbidity and mortality review teams. The Toolkit consists of materials that are standardized enough to provide useful templates for maternal morbidity and mortality review, but flexible enough for each jurisdiction/committee to adapt them for their own environment. Those who are new to the review process will have the materials, tools and resources that they need to be able to initiate a process without a lot of difficulty, and with guidance from a very experienced group who are motivated and excited to provide leadership. The Toolkit, as well as education and training materials will be hosted, in both official languages, on the SOGC's website which is being expanded to include a hub for information related to maternal mortality in Canada. The toolkit will be released in 2022.

The SOGC is also leading a research project to map the recommendations from the MPDRC that are relevant to the SOGC's practice as well as to the level of evidence for the recommendations over the last five years in order to determine gaps in practice and evidence, required updates, or opportunities for focused educational/training initiatives.

The SOGC continues to also work with the Canadian Perinatal Surveillance System for alignment and coordinated efforts for national reporting of severe maternal morbidity and mortality, and with the provincial perinatal data systems to explore models for implementation of the Toolkit and reporting. The SOGC is also partnering on several research projects related to measurement of maternal morbidity and mortality, including studies focused on Perinatal Mental Health, and liaises regularly with the UK and the USA on topics related to maternal health.

Appendix A

Summary of 2020 case reviews

Case	Type	Summary	Recommendations by Theme
EX-01	Maternal Executive	The decedent was a 33-year-old G2P0A1 who had an invitro fertilization pregnancy. There were no reported antenatal complications. Presented to hospital with cramping and abdominal pain. She was diagnosed with intrauterine fetal demise. She was admitted to hospital and labour was induced. During the induction, she became short of breath and nauseous. A short time later, she arrested and was thrombolysed due to concern for pulmonary embolism. Cause of death was thought to be probable pulmonary embolus due to a) deep vein thrombosis and b) full term pregnancy.	None
EX-02	Maternal Executive	The decedent was a 22-year-old G1P0 at 18 weeks' gestation with a history of seizures, congenital deafness, and developmental delay. Followed by a high-risk pregnancy unit. Witnessed collapse with seizure. Could not be resuscitated. Cause of death was epilepsy.	None
EX-03	Maternal Executive	The decedent was a 33-year-old woman who was approximately seven months pregnant at the time of her death. The woman was killed by her intimate partner.	None
EX-04	Maternal Executive	The decedent was a 33-year-old G1P0 previously healthy woman at six weeks' gestation. Complained of upper abdominal pain, heart burn, nausea, vomiting, dizziness, and diarrhea, no pelvic pain or vaginal bleeding. Transported to hospital and died from ruptured ectopic pregnancy of the left fallopian tube.	None

Case	Type	Summary	Recommendations by Theme
M-01	Maternal	The decedent was a 24-year-old G3P1 previously healthy woman. She had two previous therapeutic abortions. After an uncomplicated pregnancy, she was admitted with onset of labour at 36 weeks' gestation. Decedent and baby were doing well and there were no nursing concerns. Mother died three days after giving birth from sepsis due to postpartum Group A Streptococcus infection (site of infection unknown)	**Policy and procedure** 2. It is recommended that all facilities and/or organizations providing obstetrical care services develop a comprehensive maternal mortality review process based on standardized and thorough data and information collected. **Diagnosis and testing** 3. All hospitals are encouraged to utilize a modified early obstetric warning (MEOWs) system (as recommended by the Society of Obstetricians and Gynaecologists (SOGC)) and provide appropriate and recurring training to obstetrical care providers within their facilities. **Other** 4. It is recommended that the SOGC develop, distribute and promote the use of a standardized data and information collection tool in order to analyze and assess information pertaining to maternal deaths on a provincial and national level.
M-02	Maternal	The decedent was a 36-year-old G1P0. Immediate postpartum recovery in hospital was uneventful and she was discharged home. Died on day 4 post partum from necrotizing fasciitis due to infection of episiotomy site following vacuum assisted vaginal delivery.	**Transfer** 1. Healthcare providers are reminded that necrotizing fasciitis is a medical/surgical emergency. In these severe cases, transfer to an appropriate level facility should be considered expeditiously. Consideration should be given to utilizing Criticall for assistance in referral to an appropriate facility. **Obstetrical care provider** 2. Healthcare providers are reminded that in order to avoid delay, surgical treatment of necrotizing fasciitis should

Case	Type	Summary	Recommendations by Theme
			generally be performed at the presenting hospital provided an appropriately trained general surgeon and critical care support is available.
M-03	Maternal	The decedent was a 29-year-old developmentally delayed G3P2A1 at 29 weeks' gestation. Witnessed cardiac arrest. Cause of death was not ascertained, and manner of death was undetermined.	**Other** 1. It is recommended that the Regional Supervising Coroner suggest genetic counselling for the decedent's children and any of her siblings
M-04	Maternal	The decedent was a 40-year-old G4P3. Antenatal course was uneventful until 31 weeks' gestation when she called her obstetrician's office due to a few-day history of swelling in leg. Advised to get up and walk around throughout the day, elevate her legs while sitting and apply a cool cloth to the leg. Next day, presented to hospital with shortness of breath. Cause of death was pulmonary embolus.	**Obstetrical care provider** 1. Obstetrical care providers are reminded that signs and symptoms of DVT in pregnancy require urgent objective assessment. All possible cases of DVT should be approached with a high index of suspicion and appropriate urgent assessment conducted. **Obstetrical care provider** 2. Obstetrical care providers should ensure that medical advice given by office staff to patients is appropriate, reviewed in a timely and thorough manner and prioritized accordingly by the primary care provider. Virtual care (e.g., tele-practice) should be thoroughly documented, including dated and time-stamped in the chart.
M-05	Maternal	The decedent was a 45-year-old G2P1. At 29 weeks and two days' gestation, the woman presented to hospital in spontaneous labour. Fetus to be in a breech presentation. Caesarean section. Seizure-like activity. Cause of death was hemorrhagic shock due to placental abruption.	**Obstetrical care provider** 1. Obstetrical care providers are reminded that late maternal age is a significant risk that requires close surveillance and consideration for earlier planned delivery. **Policy and procedure** 2. Obstetrical care providers are reminded that massive transfusion protocol specific to the obstetrical patient should

Case	Type	Summary	Recommendations by Theme
			be established and may consider the early use of cryoprecipitate. **Obstetrical care provider** 3. Obstetrical care providers are reminded that unstable patients require a multidisciplinary (including most responsible physician) approach to care as is provided by critical care response teams (CCRTs) in hospital. **Diagnosis and testing** 4. Obstetrical care providers are reminded about performing and documenting post-delivery vital signs, including, but not limited to, fundal checks.
M-06	Maternal	The decedent was a 26-year-old G3P2. Medical history was significant for a diagnosis of epilepsy. At 38 weeks' gestation, found unresponsive in bed. Cause of death was consistent with a seizure disorder and possible positional asphyxia.	No recommendations.
M-07	Maternal	The decedent was a 39-year-old G4P3. Arrived in Canada from Bangladesh approximately three months prior. Notation on the prenatal record of 'complete placenta previa' - unsure if this information conveyed and appointments missed. Communication issues. Death was attributed to postpartum hemorrhage due to uterine atony	**Communications/documentation** 1. Obstetrical care providers are encouraged to utilize translation services and hospital or community resources when there may be language or cultural factors that could impact the patient's ability to comprehend and/or participate in care plans and make informed choices. **Policy and procedure** 2. Obstetrical care providers are encouraged to review and update policies and procedures relating to the management of significant obstetrical bleeding events.

Case	Type	Summary	Recommendations by Theme
M-08	Maternal	The decedent was a previously healthy 34-year-old G1 TPAL 0000. Noted pelvic pain and pressure. 36 weeks and six days' gestational age, the woman called the labour and delivery unit of her intended delivery hospital with complaints of nausea, vomiting and decreased fetal movement for the previous 24 hours. Speech was abnormal and she was not answering questions appropriately. Caesarean section. Cause of death was acute fatty liver of pregnancy.	**Diagnosis and testing** 1. Obstetrical care providers are encouraged to consider alternatives for obtaining diagnostic imaging (e.g., portable units) for emergent obstetrical patients. **Communications/documentation** 2. Obstetrical care providers are reminded that all conversations, including telephone assessments and decisions for care, should be well documented on the medical record.
N-01	Neonatal	The mother was a 39-year-old G10T3P2A4. Infant born at 23 weeks' gestation. Pregnancy was unrecognized and there was no prenatal care or serology completed. Cause of death was extreme prematurity. Concerns relating to the resuscitation in the emergency room.	**Obstetrical care provider** 1. Healthcare providers are reminded: • to confirm endotracheal tube placement using the steps outlined in the Neonatal Resuscitation Program (NRP) manual • early placement of the nasogastric tube is essential to effective ventilation • intravenous access is critical for fluid resuscitation to improve the outcome. **Communications/documentation** 2. Healthcare providers are reminded that all observations and procedures should be clearly documented. Consideration may be given to the inclusion of a "code pink" template form in the emergency department neonatal resuscitation kit. **Quality** 3. The hospital involved should conduct a lessons-learned case review of the circumstances surrounding this death.

Case	Type	Summary	Recommendations by Theme
N-02	Neonatal	Mother was a 33-year-old G2T1P0A0L1 at 36 weeks and two days. Planned Caesarean section. Mother presented with abdominal pain. Emergency C section for placental abruption. Infant died at three days from hypoxic ischemic encephalopathy.	**Diagnosis and testing – EFM** 1. Obstetrical care facilities are reminded that electronic fetal heart rate (FHR) monitoring strips should be retained as part of the patient's medical record.
N-03	Neonatal	The mother was a 41-year-old primiparous parturient who presented in spontaneous onset of labour at 37 weeks and 2 days. Type 2 diabetic on metformin, had hypercholesterolemia and hypertension. Infant died from birth trauma.	**Policy and procedure** 1. Obstetrical care providers at the hospital involved should review the No. 396 March 2020 (Replaces No. 197, September 2007) Fetal Health Surveillance: Intrapartum Consensus Guideline. **Obstetrical care provider** 2. Obstetrical care providers are reminded that a double set up at time of trial of forceps can decrease the time interval from decision to abandon the trial of assisted vaginal delivery to Caesarean birth. **Diagnosis and testing – EFM** 3. Obstetrical care providers are reminded that fetal heart rate monitoring should be continued through delivery despite interventions such as a trial of forceps.
N-04	Neonatal	Mother was a 35-year-old G4 TPAL 0030 who presented at 32 weeks. Concerns were identified regarding the decision to transport the mother to a tertiary centre.	**Transfer** 1. Obstetrical care providers are reminded of the importance of timely transport of out-of-scope deliveries. Deliveries to centres with an appropriate level of care offer the best chances of survival of the fetus. **Transfer** 2. Obstetrical care providers are reminded that the timely delivery of in-scope neonates is preferable to transfer to

Case	Type	Summary	Recommendations by Theme
			another facility for delivery. Transportation of a laboring woman is a risk due to the limitations in monitoring and intervention. **Quality** 3. Hospital A (the referring hospital) should conduct a lessons-learned case review.
N-05	Neonatal	Mother was a 35-year-old opioid-dependent G6P2A3. Recently released from correctional facility. Gave birth in community after receiving methadone. Infant died from global hypoxic ischemic injury.	No recommendations.
N-06	Neonatal	Mother of the deceased infant was a 35-year-old G 10 TPAL 4145 who presented to a local remote Indigenous health authority at 28 weeks and 2 days after falling down stairs. Transported to tertiary centre via air. Gave birth on route. Infant died from intraventricular hemorrhage.	**Transfer** 1. It is recommended that a standardized form for patient transfer be developed that includes all relevant information including obstetrical history, in order to assist the decision of whether to transport or not. **Transfer** 2. Consideration should be given to increasing resources for maternal and neonatal transport, including having teams attend rural/remote areas instead of risking transport of the patient. **Transfer** 3. It is recommended that the SOGC develop evidence-based recommendations to inform decision-making related to patient transport, including recommending a standardized form.
N-07	Neonatal	The mother was a 33-year-old G1P0. Concerns about communication between midwife and obstetrical	**Obstetrical care provider** 1. Obstetrical care providers are reminded that tachysystole can occur in the

Case	Type	Summary	Recommendations by Theme
		staff. Cause of death was complications of labour and delivery.	absence of an oxytocin augmentation. This, accompanied by abnormal fetal heart rate pattern with meconium and blood in the amniotic fluid, should be acted on with urgent delivery. **Communications/documentation** 2. Once a consultation has taken place and recommendations have been made, the most responsible physician (MRP) should document this and proceed with the course of care agreed upon. Timely transfer of care should occur. **Education/Training** 3. Obstetrical care providers asked to disengage the fetal head at Caesarian section should be appropriately trained to do so in order to minimize harm to the baby. Alternative techniques for disengagement of the head should be considered first. **Policy and procedure** 4. Obstetrical care providers are reminded of current fetal health surveillance guidelines (see SOGC No. 396-Fetal Health Surveillance: Intrapartum Consensus Guideline, March 2020.) **Transfer** 5. Obstetrical care providers are reminded that emergency medical services (EMS) should be utilized when transporting a woman in labour, particularly when there are complications.
N-08	Neonatal	Mother was a 28-year-old G9P5A3L5. Infant was an early-term newborn who died after presenting	**Obstetrical care provider** 1. Healthcare providers responsible for assessment and management of newborns are reminded to screen all

Case	Type	Summary	Recommendations by Theme
		on day 4 of life with severe hyperbilirubinemia.	newborns for jaundice before hospital discharge or as an outpatient at 24 – 72 hours of age if discharge is to be undertaken prior to 24 hours. It is also important that parents be provided with information regarding normal newborn behaviour and feeding.
S-01	Stillbirth	The mother was a 31-year-old G6P5. Stillborn at home with a midwife. Cause of death was extreme prematurity.	**Other** 1. The regional supervising coroner may recommend obstetrical consultation for any future pregnancies that the mother might have due to the incidental finding of placenta accrete found on placental pathology.
S-02	Stillbirth	Mother was a 37-year-old G3 TPAL 0111. Concerns about the adequacy of the prenatal care. High-risk twin delivery.	No recommendations.
S-03	Stillbirth	Mother of the stillborn was a 24-year-old primip. Pregnancy progressed normally until labour when there were ruptured membranes and meconium stained amniotic fluid from admission and inadequate labour which warranted augmentation. Cause of death was intrapartum haemorrhage.	**Diagnosis and testing** 1. When intervention is planned due to concern for fetal wellbeing, fetal heart surveillance should continue until the last moment. **Communications/documentation** 2. Obstetrical care providers are reminded that second trimester ultrasounds should include routine description of the cord insertion. **Obstetrical care provider** 3. Obstetrical care providers are reminded that when there are decelerations, the administration of syntocin should be stopped.

Full, redacted versions of reports and responses to recommendations are available to the public by contacting: occ.inquiries@ontario.ca.

Questions and comments regarding this report may be directed to:

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