



**Office of the Chief Coroner
Province of Ontario**

Maternal and Perinatal Death Review Committee

2015 Annual Report

November 2016

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This report was prepared by Dr. Rick Mann,
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. Information from these reviews is provided to Health Canada to assist in identifying and preventing maternal deaths in Canada.

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 anaesthesiology, pathology, pediatrics and family medicine.

Since its inception, the committee has reviewed a total of 351 cases and generated 653 recommendations towards the prevention of stillbirths and deaths involving mothers and neonates. In 2015, 24 cases were reviewed and 52 recommendations were made. The top five areas of concern identified in recommendations made in 2015 relate to: policy and procedure; diagnosing and testing; medical and nursing issues; communication/documentation and quality of care reviews.

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.

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. I would like to acknowledge the assistance of Ms. Kathy Kerr, Executive Lead of the MPDRC.

It is my privilege to present to you the 2015 Annual report of the MPDRC.

A handwritten signature in black ink, appearing to read 'Rick Mann', written in a cursive style.

Rick Mann, MD, CCFP, FCFP
Chair, Maternal and Perinatal Death Review Committee

Committee Membership (2015)

Dr. Sharon Dore

Society of Obstetricians and Gynecologists of
Canada Representative

Dr. Michael Dunn

Neonatologist (Level 3)

Dr. Karen Fleming

Family Physician (Level 3)

Dr. Robert Gratton

Maternal Fetal Medicine

Dr. Steven Halmo

Obstetrician (Level 2)

Ms. Susan Heideman

Perinatal Nurse

Dr. Robert Hutchison

Obstetrician (Level 3)

Dr. Sandra Katsiris

Anesthesiologist

Ms. Kathy Kerr

Executive Lead

Ms. Michelle Kryzanauskas

Midwife (Rural)

Dr. Dilipkumar Mehta

Paediatrician (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

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 similar 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 351 cases and generated 653 recommendations aimed towards the prevention of future similar deaths.
- On average, 29 cases and 54 recommendations are made each year by the MPDRC.
- The top areas of concern identified in recommendations made from 2004-2015 relate to: medical and nursing issues; policy and procedures; communications/documentation; and diagnosis and testing (including electronic fetal monitoring).
- In 2015, 24 cases were reviewed and 52 recommendations were made.
- Of the 24 cases reviewed in 2015, five were maternal, 15 were neonatal and four were stillborn

Introduction

Purpose

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 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 only and a condensed, executive review (as opposed to full committee review) is conducted.

Maternal deaths are classified by the following criteria:

- Antepartum – during pregnancy at >20 weeks gestation
- 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 similar 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.¹
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, 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.).

¹ 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 deaths in similar circumstances. 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 which may be in a position to effect the implementation of such recommendations. Organizations are asked to respond back within one year 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 Office of the Chief Coroner 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.

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 (2004-2015)

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 2004-2015, the MPDRC has reviewed a total of 351 cases. Of these cases, 106 (30%) were maternal, 159 (45%) were neonatal and 86 (25%) were stillbirths. These numbers reflect the policy of the Office of the Chief Coroner to review all maternal deaths. 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, but do not undergo formal review (and thus are not reflected in these statistics). 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.

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.

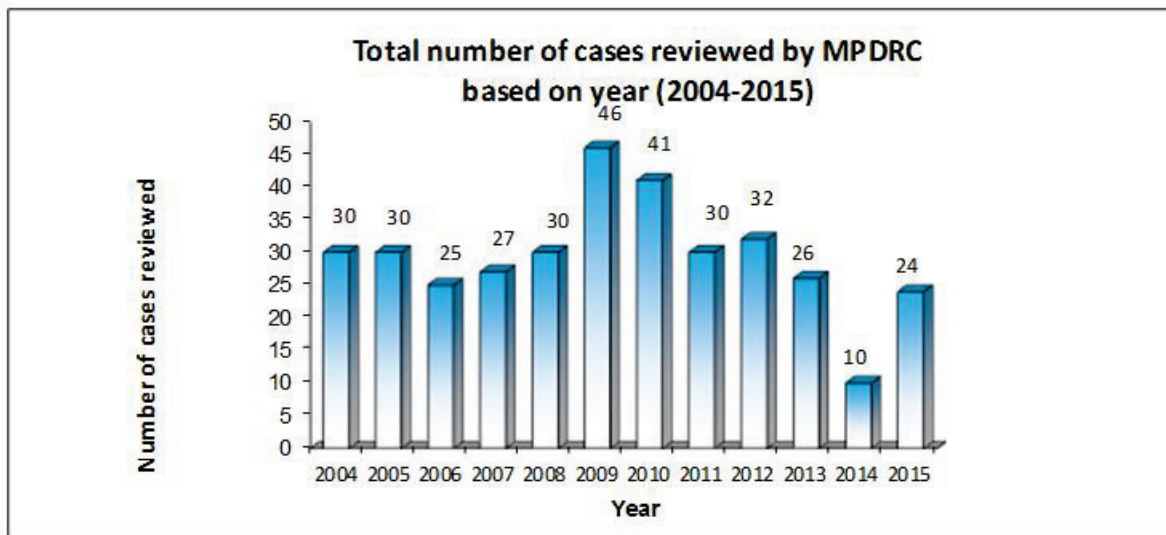
The number of cases noted in **Chart One** is based on the year the case was reviewed, which, in many cases, is not the same year in which the death actually occurred.

Chart One: MPDRC - # of Cases Reviewed (2004-2015)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Total # of cases reviewed	30	30	25	27	30	46	41	30	32	26	10	24	351
Maternal	10	12	4	15	8	21	11	3	3	11	3	5	106
Neonatal	12	11	13	12	12	16	19	14	20	10	5	15	159
Stillbirth	8	7	8	0	10	9	11	13	9	5	2	4	86

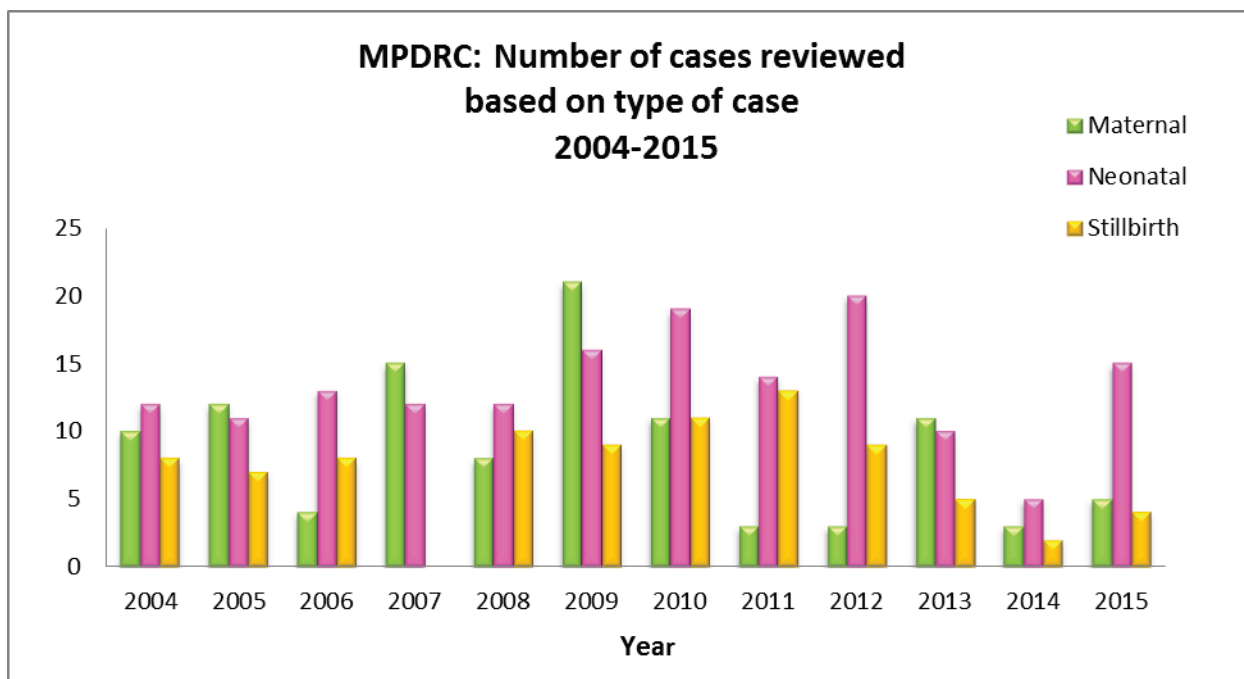
Chart One indicates that the total number of cases reviewed from 2004-2015 has varied from a low of 10 cases in 2014, to a high of 46 cases in 2009. This variance is likely reflective of committee administrative practices (e.g. time required for processing of review materials and compilation of final reports).

Graph One: Total number of cases reviewed by the MPDRC based on year (2004-2015)



Graph One demonstrates how the number of cases reviewed from 2004-2015 has remained relatively consistent, with a low in 2014 due to committee administrative issues. On average, the MPDRC reviews 29 cases per year.

Graph Two: Number of cases reviewed based on type of case (2004-2015)



Graph Two demonstrates that, overall, from 2004-2015, the majority of cases reviewed each year are neonatal deaths, followed by maternal deaths.

Chart Two: MPDRC - # of Recommendations (2004-2015)

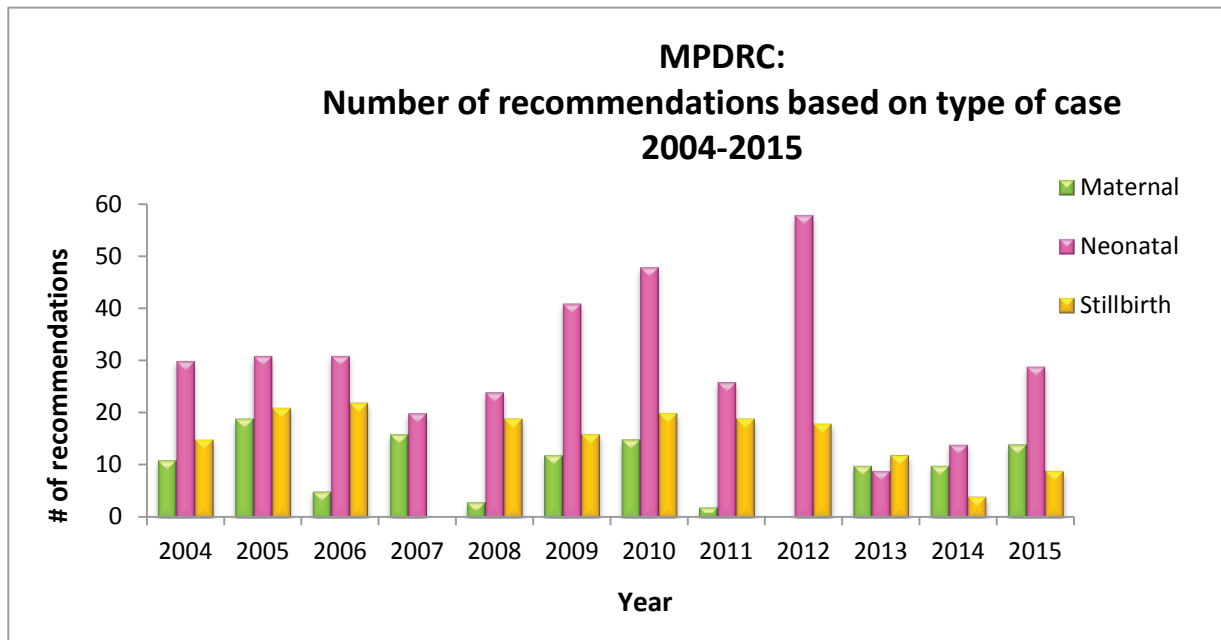
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	%	Avg.
Total # of Recommendations	56	71	58	36	46	69	83	47	76	31	28	52	653		54
Maternal	11	19	5	16	3	12	15	2	0	10	10	14	117	18%	10
Neonatal	30	31	31	20	24	41	48	26	58	9	14	29	361	55%	30
Stillbirth	15	21	22	0	19	16	20	19	18	12	4	9	175	27%	15

Chart Two indicates that the MPDRC has generated a total of 653 recommendations from 2004-2015. From this total, 117 (18%) were related to maternal cases, 361 (55%) from neonatal cases and 175 (27%) from stillbirth cases. Consistently over the years, the majority of cases and recommendations relate to reviews of neonatal deaths. On average, 54 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:

- medical (e.g. medical or nursing 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 2004-2015



Graph Three demonstrates that from 2004-2015, the majority of recommendations generated each year pertain to neonatal cases.

Chart Three: MPDRC – Number and percentage of recommendations based on area of concern/theme and type of case (2004-2015)

	Maternal	Neonatal	Stillborn	Total	% of Total
Medical/nursing	48 7%	67 10%	37 6%	152	23%
Policy and procedure	28 4%	70 10%	34 5%	132	20%
Communications/documentation	12 2%	57 9%	32 5%	101	15%
Quality	15 2%	34 5%	11 2%	60	9%
Diagnosis and testing	3 0%	52 8%	20 3%	75	11%
Diagnosis and testing - EFM	1 0%	49 7%	26 4%	76	11%
Education/Training	2 0%	19 3%	8 1%	29	4%
Resources	3 0%	13 2%	3 0%	19	3%
Transfer	5 1%	8 1%	5 1%	18	3%
Other	2 0%	2 0%	1 0%	5	1%

*Some recommendations touch on more than one theme.

Chart Three demonstrates that 23% of all recommendations made by the MPDRC from 2004-2015 relate to improving or addressing medical/nursing issues. An additional 20% 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):

- 10% of all recommendations from neonatal cases had a medical/nursing theme
- 10% of all recommendations from neonatal cases had a policy and procedure theme
- 9% of all recommendations from neonatal cases had a communication/documentation theme

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 2004-2015, there have been 76 recommendations made specifically pertaining to EFM.

Executive Summary of Cases Reviewed in 2015

Cases reviewed by the MPDRC in 2015 may involve deaths that occurred in previous years.

Total number of cases reviewed (i.e. full reviews): 24

Total number of recommendations: 52

Number of maternal full case reviews: 5

Number of maternal executive reviews: 7

Number of recommendations from the maternal deaths reviewed: 14

Number of neonatal cases reviewed: 15

Number of recommendations from the neonatal deaths: 29

Number of stillborn cases reviewed: 4

Number of recommendations from the stillborn cases: 9

A summary of all cases reviewed and subsequent recommendations made in 2015, is included as Appendix A.

Lessons Learned from MPDRC Reviews

This past year, three out of five maternal deaths reviewed by the committee involved post-partum haemorrhages (PPH). This requires a high index of suspicion from all care providers including obstetrical care providers as well as post anaesthesia care unit staff who may have infrequent call to care for a post-partum patient. Ongoing visible blood loss may not be indicative of the true blood loss. The now empty uterus can fill with blood and hide the true extent of blood loss. Uterine atony is the most common and important cause of PPH. Normally healthy women are able to compensate for significant blood loss until a critical level is reached.

Whenever possible, treatment should be a team approach with the use of a combination of uterotonics, blood products and investigations to identify the source and severity of the blood loss. Centres providing obstetrical care should consider establishing massive transfusion protocols (MTP) to initiate early on so as not to fall behind replacing blood loss. Cryoprecipitate should be considered early in the resuscitation process as pregnant women are already in a hypocoagulable state.

Another topic which played a role in stillbirths, neonatal and maternal deaths has been an increased body mass index (BMI) and pregnancy. BMI should be calculated at entry into obstetrical care and ideally be below 25 kg/m². Elevated BMI has been associated with increased risk of congenital abnormalities of the fetus, maternal complications such as cardiac disease, pulmonary disease as well as gestational hypertension and diabetes. Complications during labour and delivery, including analgesia, also increase with an elevated BMI. Consideration should be given to obtaining an anaesthetic consultation during pregnancy in women with an elevated BMI (i.e. > 25 -30 kg/m²) to plan analgesic/anaesthetic care plans during labour and delivery if they are needed. It is better to know and prepare for a possible difficult airway to manage prior to a crash Caesarian section for fetal distress or failure to progress in labour.

Appendix A

Summary of 2015 Case Reviews

Case number	Type	Summary	Themes	Recommendations
EX-01	Maternal - Executive	The decedent was a 40-year-old woman who was admitted to hospital at 29 weeks gestation with a one month history of fever, lethargy and headache. She was found to have an enlarged liver with elevated liver function tests and pancytopenia. The cause of death was noted as Hemophagocytosis Syndrome as a consequence of Systemic Lupus Erythematosus.		None.
EX-02	Maternal - Executive	The decedent was a 20-year-old woman who died at eight months gestation. The cause of death was determined to likely be a cardiac arrhythmia of genetic cause.		None.
EX-03	Maternal - Executive	The decedent was a 38-year-old woman who died of idiopathic peripartum cardiomyopathy after being admitted to hospital emergently at 36 weeks gestation.		None.
EX-04	Maternal - Executive	The decedent was a 37-year-old woman who died at 11 weeks gestation from sudden unexpected death in epilepsy (SUDEP).		None.
EX-05	Maternal - Executive	The decedent was a 27-year-old woman in the early stages of pregnancy who committed suicide.		None.
EX-06	Maternal	The decedent was a 33-year-		None.

Case number	Type	Summary	Themes	Recommendations
	- Executive	old G3P0A2 who died at 24 weeks gestation from hypoxic-ischemic encephalopathy, myocardial infarction and recent arterial dissections of both the left anterior descending coronary artery and the right coronary artery.		
EX-7	Maternal - Executive	The decedent was a 38-year-old woman who had been receiving fertility treatments. She was found deceased in her bed and there was decomposition of her remains. The cause of death was unascertained and the manner of death was undetermined.		None.
M-01	Maternal	The decedent was a 38-year-old G ₂ P ₀ who died after giving birth at 39 weeks gestation from severe hemorrhagic shock caused by post-partum hemorrhage. The cause of the post-partum hemorrhage was uterine atony.	Quality	1. The hospital involved in this case should perform an internal review of the circumstances surrounding this death. 2. The Regional Supervising Coroner (RSC) should follow up with the hospital regarding the issues identified. If, in the opinion of the RSC, systemic issues persist, the RSC should consider conducting a Regional Coroner's Review with the appropriate representatives of the hospital.
M-02	Maternal	The decedent was a 36-year-	Medical,	1. Obstetrical care providers

Case number	Type	Summary	Themes	Recommendations
		old G2A1 who died after giving birth from hemorrhagic and thromboembolic complications and gestational hypertension with preeclampsia.	diagnosis/testing, policy/procedures, communications, quality	are reminded of the potential for rapid progression of preeclampsia and in particular, associated coagulopathy. 2. Obstetrical care providers are reminded that vaginal bleeding may not be seen in post-partum hemorrhage, particularly after a Caesarean section with the cervix closed. Signs and symptoms of haemorrhagic shock must be recognized and manage as soon as possible. 3. Massive transfusion protocols should be in place in all hospitals that do obstetrical care. 4. This hospital should review its protocols for post anesthetic care, the communications between caregivers in unstable patients and the response of physicians to the post anaesthetic care unit (PACU). 5. The Maternal and Perinatal Death Review Committee (MPDRC) recommends that the Regional Supervising Coroner (RSC) follow up with the hospital regarding the issues identified. If, in the opinion of the RSC, systemic issues persist, the RSC should consider conducting a Regional Coroner's Review with appropriate

Case number	Type	Summary	Themes	Recommendations
				representatives of the hospital.
M-03	Maternal	The decedent was a 25-year-old G1 who died after giving birth at 40 weeks gestation from hemorrhagic shock secondary to uterine atony.	Medical, policy/procedures, communications,	1. Obstetrical care providers are reminded that life-threatening obstetric hemorrhage can develop suddenly and unexpectedly. Obstetrical units should have an established plan of action in place. This plan should include aggressive fluid resuscitation, control of bleeding to minimize loss and access to a surgical room and support personnel. 2. Obstetrical care providers are reminded to call for help early when obstetric emergencies arise. 3. Obstetrical care providers are reminded that in a hemorrhagic emergency, type-specific or O-negative blood is acceptable. 4. Obstetrical care providers are reminded that in the setting of cardiovascular instability, it is important to avoid prolonged attempts at conservative therapy before moving to surgical intervention, including hysterectomy. 5. Obstetrical and anaesthesia care providers should review the massive transfusion protocol at their hospital. Obstetrical units that do not have such a protocol should work with their institutions to develop

Case number	Type	Summary	Themes	Recommendations
				one.
M-04	Maternal	The decedent was a 26-year-old woman who was five weeks postpartum when she died of pulmonary thromboembolism. Elevated BMI was a risk factor.		No recommendations.
M-05	Maternal	The decedent was a 33-year-old woman who died from hemorrhagic shock from an unsuspected ruptured right tubal pregnancy.	Diagnosis/testing, policy/procedures	1. All women of reproductive age whom may possibly be pregnant should undergo a pregnancy test before elective gynecological surgery. 2. The hospital where this death occurred should review its policy and procedure for documenting the pregnancy status of reproductive age women undergoing elective surgery.
N-01	Neonatal	The decedent was an eight-hour-old male infant born at 34 weeks four days gestation who died from perforation of the left ventricular wall and intraventricular septum by a left chest tube. The placenta showed evidence of chorioamnionitis and fetal inflammatory response.	Diagnosis/testing	1. Care providers are reminded to perform imaging prior to chest tube insertion if the condition of the infant allows.
N-02	Neonatal	The decedent was a nine-day-old male infant born at 37 weeks one day gestation who died from hypoxic-ischemic encephalopathy due to perinatal asphyxia of undetermined etiology with		No recommendations.

Case number	Type	Summary	Themes	Recommendations
		multiple placental abnormalities as potential contributing factor.		
N-03	Neonatal	The decedent was a one-hour-old male infant born at 33 weeks gestation who died from perinatal asphyxia due to (a) pulmonary hypoplasia (b) obstructive uropathy from membranous obstruction of the urethra.	Medical, quality, communications, diagnosis/testing,	1. Obstetrical care providers are reminded to counsel obese pregnant women about the importance of weight gain, nutrition and food choices. They should counsel people to enter into pregnancy with a BMI of <30kg/m² and take opportunities at periodic health examinations and other visits to discuss weight loss prior to conception. (as per SOGC Clinical Practice Guideline No. 239, February 2010, Obesity in Pregnancy). 2. Obstetrical care and ultrasound in pregnancy providers are reminded that obese women are at increased risk for fetal anomaly. In the obese, the ultrasound should be performed at 20-22 weeks gestational age. (as per SOGC Clinical Practice Guideline No. 239, February 2010, Obesity in Pregnancy) Secondary or tertiary level ultrasound and counseling with a perinatologist should be sought as appropriate. 3. Obstetrical care and ultrasound providers are reminded of the anomaly that posterior urethral valves occur with varying

Case number	Type	Summary	Themes	Recommendations
				severity in 1:8000 male fetuses. They should be suspicious whenever bilateral hydronephrosis is seen in a male infant. If seen, then appropriate follow up and consultation should be sought. 4. The obstetrical care providers and radiologist involved should review the SOGC Guideline No. 197, September 2007, "Fetal Health Surveillance: Antepartum and Intrapartum Consensus Guideline" specifically pages S18-19 regarding the biophysical profile. 5. The obstetrical care group involved should consider a method of improved communication amongst themselves to ensure that the risks, concerns and plans for each pregnancy are clearly communicated to all antenatal care providers. 6. The Maternal and Perinatal Death Review Committee (MPDRC) recommends that the Regional Supervising Coroner (RSC) follow up with the hospital regarding the issues identified. If, in the opinion of the RSC, systemic issues persist, the RSC should consider conducting a Regional Coroner's Review with the appropriate representatives of the

Case number	Type	Summary	Themes	Recommendations
				hospital. 7. As the mother of the deceased infant is at increased risk for gestational diabetes, fetal macrosomia, shoulder dystocia and Caesarian section, the RSC should liaise with her and suggest enhanced monitoring for any future pregnancies.
N-04	Neonatal	The decedent was a two-day-old male infant born at 40 weeks gestation who died from severe hypoxic-ischemic encephalopathy due to (a) multiple organ dysfunction (b) maternal uterine rupture. The mother was a 36-year-old G5T1P2A1L4 who was high risk due to Crohn's disease, obesity (BMI 35) and had a history of substance abuse (daily tetrahydrocannabinol (THC) use).		No recommendations.
N-05	Neonatal	The decedent was a male infant born at 40 weeks three days gestation who died at 43 minutes of age from obstructed labour in association with macroencephaly. The mother was a 31-year-old G1P0.	Policy/procedures, quality	1. Obstetrical care providers are reminded of the SOGC Advances in Labour and Risk Management of Labour (2010-2011) Guidelines with respect to prolonged second stage in labour. 2. The Maternal and Perinatal Death Review Committee (MPDRC) recommends that the Regional Supervising Coroner (RSC) follow up with the hospital regarding the issues identified. If, in the

Case number	Type	Summary	Themes	Recommendations
				opinion of the RSC, systemic issues persist, the RSC should consider conducting a Regional Coroner's Review with the appropriate representatives of the hospital.
N-06	Neonatal	The decedent was a female infant who died at three hours of age. There was no anatomical cause of death. The mother was a 40-year-old G2P1. Induction was planned at 39 weeks because of advanced maternal age.	Policy/procedures, training, diagnosis/testing - EFM	1. All obstetrical care providers should have an established protocol for the attendance of pediatric and respiratory therapist staff for at-risk deliveries or when complications are encountered during labor. 2. All healthcare staff involved in labour and delivery should be Neonatal Resuscitation Program (NRP) certified. 3. Obstetrical care providers are reminded of the necessity of fetal heart rate monitoring during second stage of labour. If this can't be accomplished by external means, a fetal scalp clip should be applied if available. (see SOGC Guidelines – 2007).
N-07	Neonatal	The decedent was a male infant born at 41 weeks gestation who died at four days of age from hypoxic ischemic encephalopathy. The mother was a 35-year-old G4T2A1L2.	Medical, diagnosis/testing, policy/procedures	1. Obstetrical Care Providers are reminded of the following recommendations from previous MPDRC reviews regarding hypertensive obstetrical patients: • Obstetrical care providers are reminded that

Case number	Type	Summary	Themes	Recommendations
				hypertensive disease in pregnancy is one of the main causes of maternal and perinatal morbidity and mortality. (MPDRC-2007-M-08, Rec 1) • Obstetrical care providers are reminded about the importance of ultrasound assessment of fetal growth and well-being in the management of hypertensive obstetrical patients. (MPDRC-2011-N-13, Rec 2) 2. Obstetrical Care Providers are reminded of the following recommendations from previous MPDRC reviews regarding fetal health surveillance: • Obstetrical Care providers are reminded of the SOGC Fetal Health Surveillance: Antepartum and Intrapartum Consensus Guideline, JOCG Vol29 No9, Sept, 2007. (MPDRC-2010-N-17, Rec 1) • Obstetrical Care Providers are reminded of the importance of being familiar with and implementing the SOGC Fetal Health Surveillance: Antepartum and Intrapartum Consensus Guideline, JOCG Vol29 No9, Sept, 2007. (MPDRC-2010-N-20, Rec 1) • Obstetrical care providers responsible for fetal monitoring should follow

Case number	Type	Summary	Themes	Recommendations
				the guidelines as set out in the SOGC Fetal Health Surveillance: Antepartum and Intrapartum Consensus Guideline, JOCG Vol29 No9, Sept, 2007. (MPDRC-2011-N-12, Rec 4)
N-08	Neonatal	The decedent was a male infant born at 36 weeks and one day gestation who died at 27 minutes of age from bilateral diffuse severe renal dysplasia. The mother was a 32-year-old G5P3A1.		No recommendations.
N-09	Neonatal	The decedent was a female infant born at 41 weeks and four days gestation who died at 19 days of age from perinatal asphyxia. Contributing factors: intrauterine growth retardation, placental fetal thrombotic vasculopathy, maternal hypertension. The mother was a 31-year-old G1 with a history of chronic controlled hypertension.	Medical	1. Obstetrical care givers are reminded that for women with uncomplicated pre-existing hypertension who are otherwise well at > 37 weeks' gestation, delivery should be considered at 38+0 to 39+6 weeks' gestation. (Refer to: Recommendation 91 of the SOGC Clinical Practice Guideline No. 307, May 2014; Diagnosis, Evaluation, and Management of the Hypertensive Disorders of Pregnancy).
N-10	Neonatal	The decedent was a female infant born at 33 weeks and three days gestation who died at one month of age following an episode of severe gram negative septicemia with shock and coagulopathy. The mother was a 36-year-old G6P0. The pregnancy was achieved by in vitro fertilization (IVF).		No recommendations.

Case number	Type	Summary	Themes	Recommendations
N-11	Neonatal	The decedent was a male infant born at 40 weeks gestation who died at one month of age from anoxic brain injury due to birth trauma. Placental examination indicated acute chorionamnionitis and chorionic vasculitis. The mother was a 29-year-old G3A2 with two previous early spontaneous losses.		The hospital conducted an internal review and produced recommendations. No recommendations from MPDRC.
N-12	Neonatal	The decedent was a female infant born at 39 weeks and six days gestation who died at 24 hours of age from hypoxic ischemic encephalopathy.	Diagnosis/testing – EFM, medical, policy/procedures	1. Obstetrical care providers are reminded of the SOGC Induction of Labour Clinical Practice Guidelines (no. 296, September 2013) when inducing or augmenting a labour. 2. Obstetrical care providers are reminded of the SOGC Fetal Health Surveillance, Antepartum and Intrapartum Consensus Guideline (no. 197, September 2007). 3. Obstetrical care providers are reminded that when atypical or abnormal fetal heart rate is experienced in labour, arrangements should be made to evaluate the fetal status by internal scalp monitoring or consideration of fetal scalp gases. If there is ongoing concern where proper evaluation cannot be made, then urgent delivery should follow. 4. Obstetrical care providers

Case number	Type	Summary	Themes	Recommendations
				are reminded that with prolonged active second stage of labour, there is increased risk of the fetus becoming acidotic. Accurate assessment of progress, monitoring and evaluation of fetal health is essential.
N-13	Neonatal	The decedent was a male infant born at 40 weeks gestation who died at two days of age from hypoxic-ischemic encephalopathy due to intrauterine hypoxic-ischemic stress, cause unknown, preceding labour and delivery. The mother was a 29-year-old G1P0.	Diagnosis/testing – EFM, communications	1. Obstetrical care providers are reminded of the criteria for an abnormal fetal heart rate tracing and the action required as defined by SOGC Intrapartum Fetal Surveillance Guidelines published in September 2007. 2. Obstetrical care providers are reminded of the importance of complete, accurate, timely and detailed documentation of all actions, assessments and decisions.
N-14	Neonatal	The decedent was a male infant born at 40 weeks and two days gestation who died at 24 hours of age from Group B Streptococcal sepsis. The mother was a G4P3.	Transfer, quality, diagnosis/testing, training, policy/procedures	1. All paramedics and emergency health attendants and midwives review the Ministry of Health and Long Term Care's Basic Life Support (BLS) Patient Care Standards (January 2007, Version 2.0). , Section 5 – Obstetrical Conditions, Midwife at the Scene. 2. All paramedics and emergency health attendants should be required to successfully complete the Neonatal Resuscitation (NRP) course annually.

Case number	Type	Summary	Themes	Recommendations
				3. All midwifery clinics in Ontario should develop Transport From Out-of-Hospital protocols. 4. Midwives in Ontario are reminded of the use of pulse oximetry in neonatal resuscitations. 5. Midwives, EMS, Senior Hospital Administration, Chiefs of Maternal and Newborn Care in the region where this death occurred should meet to discuss roles and call algorithms, when and how to manage deviations in that process as determined by severity, primary provider on scene, nature of call (maternal or neonatal) and scope of services provided by potential transfer facilities. This case would be a good review for all involved in the transfer and use of the Basic Life Support (BLS) Patient Care Standards (January 2007, Version 2.0). , Section 5 – Obstetrical Conditions, Midwife at the Scene as a resource. 6. The EMS service involved should examine the protocol for transfer of a neonate in presumed respiratory distress. This should include a review of the mechanism (e.g. incubator, baby seat) and position for the transfer (e.g. semi sitting or prone or side lying), the timing of

Case number	Type	Summary	Themes	Recommendations
				the transfer (addressing the specific delays in this case), clinical care provision (e.g. CPAP or ongoing PPV), the allocation of destination based on appropriate care provider (e.g. pediatrician consulted, but baby sent elsewhere in same hospital region) and services for the emergency and recognition of primary midwife at scene. Basic Life Support Patient Care Standards-Jan 2007 Section 5 - Obstetrical Conditions, Midwives at the Scene should be considered in the review also.
N-15	Neonatal	The decedent was a female infant born at 39 weeks and three days gestation who died at 11 hours of age. The cause of death was undetermined. The mother was a 35-year-old G1P0 medical history of human papillomavirus and bacterial vaginosis.	diagnosis/testing, resources	1. The College of Midwives should consider neonatal point-of-care glucose testing equipment as essential.
S-01	Stillbirth	The mother was a 19-year-old G1P0 who presented in labour at 39 weeks gestational age. The cause of death for this stillborn was determined to be a cord complication. Placental insufficiency was a contributing factor.	Policy/procedures, communications, training, quality	1. Obstetrical care providers are reminded of the Society of Obstetricians and Gynecologists of Canada (SOGC) Guidelines for the classification and management of intrapartum fetal heart rate patterns. (SOGC September 2007).

Case number	Type	Summary	Themes	Recommendations
				- Obstetrical care providers are reminded of the importance of full, accurate and timely documentation. - The facility where this death occurred should strongly consider participating in ALARM and/or MORE-OB for all Obstetrical Care Providers. - This facility should perform an Internal Review in this case with specific emphasis on fetal health surveillance, management of second stage labour, communication and documentation.
S-02	Stillbirth	The mother was a 41-year-old G2P1. The immediate cause of death was noted to be: placental abruption and uterine tear due to uterine hyperstimulation of labor induction with advanced maternal age as a contributing factor.		No recommendations.
S-03	Stillbirth	The mother was a 31-year-old G1P0. The cause of death was undetermined.		Obstetrical care providers are reminded of the association between adverse fetal outcomes with abnormal serum markers as identified in Obstetrical Complications Associated With Abnormal Maternal Serum Markers Analytes (SOGC Clinical

Case number	Type	Summary	Themes	Recommendations
				Practice Guideline 2008) and IUGR: Screening, Diagnosis, and Management (SOGC Clinical Practice Guideline 2013). 2. Obstetrical care providers are reminded that relevant clinical investigations should be documented on the prenatal record.
S-04	Stillbirth	The mother was a 31-year-old G2T1P0A0L1. Cause of death was acute perinatal asphyxia of undetermined etiology.	Diagnosis/testing – EFM, transfer	1. Obstetrical care providers are reminded to note both maternal and fetal heart rate to ensure that it is the fetal heart rate noted at auscultation. 2. Obstetrical care providers are reminded that meconium staining is an indication for electronic fetal monitoring (EFM) in a hospital obstetrical unit. 3. Midwives are reminded that meconium in the amniotic fluid of a woman just commencing active labour at home at a distance to emergency obstetrical services, should be transferred to a hospital setting for appropriate care of the newborn in the presence of meconium.

Questions and comments regarding this report may be directed to:

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