The Maternal and Perinatal Health Standards Committee 2014 Annual Report

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Acknowledgements

The Maternal and Perinatal Health Standards Committee (MPHSC) is pleased to present the 38th Annual Report for the calendar year 2014.

The MPHSC wishes to acknowledge the support of the following organizations, committees, and individuals:

- Manitoba Health and the Manitoba Health Information Management Branch.
- Health Records Departments at institutions participating in the audit process.
- Office of the Chief Medical Examiner.
- The College of Midwives of Manitoba.
- The College of Registered Nurses of Manitoba.
- Standards Committees of the Women and Child Programs, Emergency Medicine Programs, Internal Medicine Programs, Surgery Medicine Programs at the two tertiary centres in Winnipeg and all other Manitoba rural hospitals which provide women and child health.
- Independent reviewers whose expert opinions have been sought by the MPHSC.
- All physicians and health care workers whose cooperation in providing information was essential to the review process.

The Committee is grateful to Manitoba Health for providing financial support.

The Committee is also grateful and appreciative for the tireless administrative support of Mr. Jason Martin of The College of Physicians and Surgeons of Manitoba.

Forward and Editorial Comments from the Medical Consultant

It was my pleasure to have led the production of this annual report of the Maternal and Perinatal Health Standards Committee (MPHSC) of the College of Physicians of Surgeons of Manitoba for the calendar year of 2014.

While this report summarizes completed reviews of cases from 2014, and to keep everyone up to date of recent developments of the MPHSC, I have included a synopsis of such developments that have occurred in the past year of 2017.

Bringing case reviews from a certain calendar year to closure takes time. Following case reviews by the hospital standards committees and rural standards committees, the reports of which are sent to the MPHSC, the medical consultant reviews these reports again. Such secondary review at the level of the College may precipitate the need for further information, review, and re-classification of cases. Cases that are deemed by the medical consultant to have been controversial are then raised to the committee members of the MPHSC for further discussion or consent. The committee, through its medical consultant, ensures that educational activities take place when such activities are needed to prevent a recurrence of such cases.

Currently we are working hard to bring to closure case reviews from the year 2015. The summary of these cases and the subsequent deliberations will be presented in the upcoming report to be released in 2018.

This report is organized in a format to reflect the work of the MPHSC whose objectives and goals are:

- Maintain and improve quality of maternal and perinatal care through education.
- Contribute to monitoring and improvement of the quality of obstetrical and neonatal care in Manitoba.
- Determine factors responsible for all perinatal deaths (stillbirth and early and late neonatal deaths) and specified maternal, perinatal and late neonatal morbidity at the family, community and medical care levels.
- Maintain a constant database for the ongoing monitoring of maternal mortality, perinatal and late neonatal mortality and specified morbidity to allow for meaningful interpretation.
- Provide analysis, education and recommendations related to prevention.

The case summaries are again divided in this report into three broad categories:

I. Those that are deemed “Preventable, or Theoretically Preventable” with causative factors pertaining to physician error in judgement or technique, in hospital error in management, patient error in judgement, inadequate or absent documentation, errors in communication, or problems precipitated by resource issues.
II. Those that are deemed “Non-preventable and Unavoidable”.
III. Those that could not be classified by the MPHSC primarily due to absent or missing documentation.

The cases in each of the above broad categories are sub-classified into those pertaining to maternal mortality, maternal morbidity, perinatal and late neonatal mortality, and perinatal and neonatal morbidity.

We aimed to include all summaries of cases that were judged to be preventable or theoretically preventable and a select number of cases that were non-preventable and unavoidable.
Action taken by the MPHSC and/or local hospital standards committees and rural area standards committees, particularly those of educational nature, or administrative nature are described for each case that has been deemed preventable or theoretically preventable.

In the executive summary we have included a non-exhaustive list of areas where improvements are possible based on the cases reviewed and presented in this report. Addressing issues in those particular areas may reduce future preventable mortalities and morbidities.

Definitions of terms used for the purpose of this report are included. Particular statistics that may give perspective to the case summaries have been included. For the interested reader of a more comprehensive vital statistics report, the reader is directed to visit the Manitoba Health website at http://www.gov.mp.ca/health

We hope the contents of this report will be of educational value to the readers. For any feedback, please send comments to Mr. Jason Martin, Administrative Assistant to the Maternal and Perinatal Health Standards Committee, at jmartin@cpsm.mb.ca.

Respectfully submitted,

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MPHSC Executive Summary

The Perinatal Mortality rate, according to the Vital Statistics Agency of Manitoba 2015 Annual Report was 13.0 per 1000 births in 2014 which is an increase from the rate of 11.5 in 2013. Statistics Canada reports a Perinatal Mortality rate of 8.9 in 2014 which is an increase from the rate of 7.2 in 2013. The two agencies use different definitions for calculating perinatal mortality; The Vital Statistics Agency of Manitoba's definition includes stillbirths ≥500 grams or born of ≥20 weeks gestation, plus neonatal deaths up to 7 days of life. Statistics Canada includes stillbirths of ≥28 weeks plus neonatal deaths up to 7 days of life.

There were 6 maternal deaths reported to the MPHSC in 2014. This number is much higher than what was reported in previous years, but in 2014, the MPHSC decided to include all pregnancy related direct and indirect maternal deaths that occurred up to 6 months post-partum. This will allow the MPSHC to capture most cases of maternal deaths related to suicide as a result of post-partum depression, embolism, delayed onset of infections, etc. These cases were not captured in our reviews in previous years.

Of the six cases of maternal deaths, one occurred in the postpartum period and was secondary to suicide because of postpartum depression; the remaining five deaths occurred in the antenatal period. Three of the maternity deaths in the antepartum period were secondary to suicide, one was secondary to a medical complication likely exacerbated by pregnancy, while the last case remains uncertain as to causality given that MPHSC was unable to obtain documents related to that death to date. The MPHSC is still investigating possible causes which are focused on the death being secondary either to a medical neurologic complication (encephalitis or hemorrhage) vs. suicide. This latter case is not reported in this annual report. Of the five cases reported, 2 were theoretically preventable (IA.1, IA.2), 2 were classified as non- preventable (IIA.1, IIA.2), and one was unclassifiable (IIIE.1)

Given concerns of depression being associated with maternity deaths in the antepartum and postpartum period, the CPSM issued a newsletter item in 2014 entitled "Identification of and Intervention in Postpartum Depression". The WRHA also released a "Perinatal Mental Health Toolkit" and initiated a program on "Mental Health Promotion", both accessible on the WRHA website.

There were 27 cases of maternal morbidity that were reviewed by the MPHSC. Of those cases, 20 were classified as non-preventable and unavoidable, 4 cases were classified as preventable, and a further 3 cases were classified as theoretically preventable. Of the three preventable cases, one was due to uterine inversion resulting from inappropriate pulling on the cord to deliver the placenta, hence representing a physician error in judgement and technique. One was due to an error in documentation/communication, and two were due to physician error in judgement and technique. Of the three theoretically preventable cases, one was due to physician error in judgement, one was due to in hospital error in management as well as physician error in judgement and one was due to family or patient error in judgement. We present four such cases in this report (I. B.1 – I. B.4).

There were 73 stillbirths reported to the MPHSC in 2014. One third of the stillbirths occurred without any identifiable cause. Nine stillbirths were related to genetic or lethal anomalies. One was classified as preventable and ten were classified as theoretically preventable. The case that was classified as preventable was due to family or patient error in judgement. Of the 10 cases classified as

theoretically preventable, 3 were due to physician error in judgement with a further case due to physician error in judgement and error in communication, 2 were due to family or patient error in judgement, 1 was due to in hospital error in management, and 1 due to resource issues. Two cases were classified as theoretically preventable with system failure in the provision of mental health and socioeconomic support, which was a new causative factor established by the MPHSC in 2017.

In addition, there were 56 cases of early and late neonatal deaths reported to the College. Of those cases, 2 were classified as theoretically preventable with family or patient error in judgement (I. C.7, I. C.8) and one case was unclassifiable (III. E.2). All other cases were classified as non-preventable and unavoidable. We present 8 cases of neonatal death in this report.

There were 223 cases of neonatal morbidities reported to the MPHSC in 2014. All of these cases were reviewed by the medical consultant and many were reviewed by the MPHSC. There were four cases deemed preventable with the following causative factors which contributed to the outcomes:

- In hospital error in management and error in communication.
- Patient error in judgement.
- Physician error in judgement.
- Error in documentation/communication.

There were 14 cases of neonatal morbidity that were classified as theoretically preventable with the following causative factors (some cases had more than one causative factor) which may have contributed to the outcomes:

- Seven cases having physician error in judgement.
- Five cases having family or patient error in judgement.
- Four cases having in hospital error in management.
- One case having error in documentation/communication.

In all the above preventable and theoretically preventable cases, educational letters and educational activities took place for the health care workers involved.

Root cause analysis for the preventable or theoretically preventable mortalities and morbidities, identified several areas where improvements may alter outcomes in the future.

1. Resource issues that caused a delay in delivery of appropriate care:
    a. A delay in booked induction of labour due to resource deficiencies resulting in a stillbirth (I. C.1).
    b. Inappropriate transfer of a patient in labour due to resource deficiency (I. D.1).

2. Error in judgement or management by physician with or without error in hospital staff management was associated with preventable/theoretically preventable maternal and neonatal morbidity:
    a. Use of inappropriate antibiotics in context of chorioamnionitis (I. B.1, I. D.4).
    b. Inappropriate discharge of a patient with concerning signs of simmering infection leading to necrotizing fasciitis (I. B.1).
    c. Delay in expedited needed interventions resulting in preventable maternal or neonatal morbidity (I. B.2, I. B.3, I. D.5).

d. Inappropriate or absence of intrapartum fetal monitoring (I. D.1, I. D.2, I. D.3).
e. Substandard management of pre-eclampsia and/or severe hypertension (I. C.2, I. C.3, I. D.2)
f. Poor communication between disciplines (I.C.5, I. D.7)
g. Errors interpreting and acting on concerning fetal heart tracings (I. C.4, I. D.8, I. D.4).

3. System deficiencies that may have contributed to maternal mortality and perinatal mortality:
    a. Failure to react appropriately to signs and symptoms of postpartum depression (I. A.1).
    b. Short comings of the health care system in being able to reach out to patients who do not seek prenatal care in a background of pre-existing depression (I. A.2, I. C.6).

4. Patient non-compliance with offered care, absent or delayed prenatal care, resulting in theoretically preventable maternal death (I. A.2, I. B.4), stillbirth (I. C.9), neonatal mortality (I. C.7), and neonatal morbidity (I. D.8, I. D.9).

MPHSC in 2017

The MPHC has met on three occasions on 2017, reviewing and classifying a total of 94 cases. Significant fact seeking and educational correspondence ensued from these meetings.

In 2017, we continued to receive a broader network of reports from the majority of rural centres throughout the province compared to previous years from the following centres:

- St. Boniface General Hospital
- Health Sciences Centre
- Boundary Trails Health Centre
- Brandon General Hospital
- Bethesda Hospital
- Ste. Anne Hospital
- Selkirk and District General Hospital
- Portage and District General Hospital

We are still striving to obtain reviews from all other rural hospitals in Manitoba for the reviews of the MPHSC to be more inclusive.

The MPHSC faces difficulty when information received at the College is incomplete or essential documents are missing. This causes delays in reviewing and classifying of cases and on occasion, the MPHSC cannot classify cases and labeling them unclassifiable as to preventability.

The MPHSC wrote one item for the College newsletter in 2017 titled “Recording of Tdap and Influenza Vaccination on Prenatal Records.

With the cooperation of the Chief Medical Examiner of Manitoba, the MPHSC continues to be able to review all maternal deaths during pregnancy and up to 6 months postpartum which were directly or indirectly related to pregnancy and which were not captured before. Such deaths may have occurred after discharge from a facility or did not occur in a facility. Examples of such cases include suicides secondary to postpartum depression or due to medical illnesses that may have been exacerbated by pregnancy. Such reviews tend to be multidisciplinary in nature.

Definitions

Births, Gestational Age and Birth Weight

Live birth: The complete expulsion or extraction from the mother irrespective of the duration of pregnancy, of a product of conception in which, after such expulsion or extraction, there is breathing, beating of the heart, pulsation of the umbilical cord, or unmistakable movement of voluntary muscle, whether or not the umbilical cord has been cut or the placenta attached. (Taken from *the Vital Statistics Act)*
The data in this report are limited to births where the birth weight was 500 grams or greater.

Gestational Age: The duration of gestation measured from the first day of the last normal menstrual period. Gestational age is expressed in completed days or completed weeks. If the date of the last menstrual period is uncertain or unknown, an age estimate based on the ultrasound will be recorded as the gestational age:

- **preterm:** less than 37 weeks of gestation (<259 full days)
- **term:** between 37 and 41 weeks of gestation (between 259 and 286 full days)
- **post term:** more than 41 completed weeks of gestation (>286 full days)

Low Birth Weight: Deliveries (live or stillborn) weighing less than 2500 grams at birth.

Delivery: For the purposes of this report, a delivery refers to the completion of a pregnancy, regardless of how many fetuses are involved (i.e. a multiple birth is considered one delivery).

Perinatal Mortality

Stillbirth (Fetal Death): The birth of a fetus weighing 500 grams or more and/or having a gestational age of ≥20 weeks from last normal menstrual period (LNMP), who shows no sign of life after birth.

Neonatal Death: The death of a live born infant occurring less than 28 full days after birth:

- **early:** before the 7th full day of life
- **late:** between the 8th and 28th full day of life

Perinatal Death: All stillbirths (fetal deaths) and early neonatal deaths.

Maternal Mortality

Maternal Death: The death of a woman known to be pregnant or within 42 days of delivery or termination of the pregnancy, irrespective of the duration of or site of the pregnancy:

- **direct obstetric:** resulting from complications of pregnancy, childbirth, or the puerperium (e.g. exsanguination from rupture of the uterus)

- **indirect obstetric:** a non-obstetric medical or surgical condition which either antedated pregnancy or was aggravated by physiological adaptations to pregnancy (e.g. mitral stenosis)
- **non-obstetric:** resulting from accidental or incidental causes in no way related to pregnancy (e.g. automobile accident)

Mortality Rates

Unless otherwise specified, overall rates are computed on the basis of births and deaths of infants weighing 500 grams or more, or were at ≥20 weeks gestation from last menstrual period. These rates do not include births and deaths where the weight is unknown.

Stillbirth Rate (fetal death rate): The number of stillbirths per 1,000 total births.

Neonatal Mortality Rate: The number of neonatal deaths per 1,000 live births:

- **early:** before the 7th full day of life
- **late:** between the 8th and 28th full day of life

Perinatal Mortality Rate: The total number of stillbirths and early neonatal deaths per 1,000 total births (live births and stillbirths).

Levels of Facility Service

Level 0 – No organized elective obstetrics. (Unintended deliveries may occur)

Level I – Primary Care Centre: An obstetrical facility for mothers and newborns that have no detectable major risks in the prenatal period.

- Provides peripartum care for normal pregnancies.
- Ideally performs 25 or more deliveries per year.
- Ideally has the capacity to perform Caesarean section or have Caesarean section services available within 30 minutes from the determination of the need to do so.

Level II – Intermediate Care Referral Centre: A facility which has additional obstetrical and neonatal resources to a Level I hospital, and can provide treatment of mothers and newborns who present a risk.

- Meets all Level I requirements.
- Meets all considerations of the delivery of the normal to intermediate/high risk pregnancy and care of the neonate.
- Ideally performs 250 deliveries per year.
- Functionally organized to accept referred patients to a defined level of care.

Level III – Tertiary Care Referral Centre: In addition to Level I, and Level II services, supplemental technical services are available for dealing with high-risk pregnancies and for providing specialized perinatal care.

- Meets all Level I, and Level II requirements.

- Provides all associated maternal and neonatal surgical and medical services including high-risk obstetrical and neonatal services.
- Accepts transfers of infants and mothers from facility Levels I, and II.

Case Reviews

Modus Operandi

The following are case summaries of the cases reviewed by hospital Standards Committees, regional Standards Committees, and by the Maternal and Perinatal Health Standards Committee (MPHSC). Cases are identified for review based on abstraction criteria developed by the MPHSC (see appendix). All cases reviewed by standards committees at urban and rural centres are referred to the Medical Consultant of the MPHSC, who in turn reviews the cases again. Many cases are referred to the MPHSC for further review or consent.

Standards committees classify the cases according to preventability of poor outcomes and may identify errors in management, technique, documentation, or resources. In most cases the Medical Consultant would agree with the classification by the hospital standards committees; however, if there is disagreement or there are issues that have been identified by the Medical Consultant as being problematic and not addressed by the hospital standards committee, then letters of correspondence would ensue between the Medical Consultant of the MPHSC and the Chair of the hospital standards committee. The final classification of the case is further validated by members of the MPHSC at their regular quarterly meetings.

For cases that have been identified as being "preventable and avoidable" or "theoretically preventable and avoidable" and where errors in judgement, management, technique, or documentation have been identified, the local standards committee or alternately the MPHSC will send letters of education and recommendation to the parties involved in these cases.

This may involve:

- Recommending alternate routes of management in similar future cases.
- Recommending educational programs.
- Request that protocols be developed to deal with similar scenarios in the future.
- Request referral to other regulatory bodies such as the College of Midwives of Manitoba.
- In extreme cases referral to the Registrar of the College of Physicians and Surgeons of Manitoba may be undertaken.
- In cases where resource issues have been identified, the Winnipeg Regional Health Authority as well as Manitoba Health are also informed.

The following cases summaries are divided into three major categories:

I. Cases classified as "preventable and avoidable" or "theoretically preventable and avoidable".
II. Cases classified as "non-preventable and unavoidable".
III. Cases classified as "unclassifiable".

Further, the cases in the above three categories are subdivided into cases of:

A. Maternal Mortality
B. Maternal Morbidity
C. Perinatal Mortality
D. Perinatal Morbidity

The following summaries are not intended to be inclusive of all cases reviewed by the MPHSC that occurred in 2014. We have included all cases where outcomes are deemed preventable and select cases where outcomes were deemed to be non-preventable and unavoidable.

I. Preventable, Theoretically Preventable, Avoidable:
A. Maternal Mortality

I. A.1

This case was reviewed for maternal mortality.

A 31-year-old G1 had a very smooth pregnancy. There were no identified medical or surgical problems and no history of social issues. She was a non-smoker and there was no history of substance abuse. She presented at 39 weeks gestation with spontaneous rupture of membranes. She was under the care of a family physician and at term was referred to an obstetrician. Her labour was augmented with oxytocin. The labour progress was quite slow but she got to full dilation. It was after 36 hours from onset that she underwent an urgent caesarean section for failing to progress. Her second stage was about 7 hours long.

Postpartum, she expressed fatigue, the baby had jaundice and she was having difficulty with breast feeding for which a lactation consultant was summoned. She was discharged, and on day 3, as per protocol, she was followed up by public health nursing. She expressed her concerns regarding difficulty at breast feeding, extreme fatigue and lack of sleep. On day 8 postpartum she committed suicide.

The MPSHC reviewed medical records from this patient, and there were no risk factors or past history of mental health issues that would have signaled the possibility of severe postpartum depression resulting in this suicide. Toxicology done was positive for acetaminophen, naproxen, and naproxen metabolite.

After much deliberation, it appears that this was a case of acute severe postpartum depression resulting in suicide. The patient expressed her difficulties to the public health nurse; however, the MPHSC did not have access to the public health records, and so we were unable to determine the impressions the public health nurse had on the patient's demeanor and tone of voice. The MPHSC is also unsure whether any further action was taken by the nurse such as plans for further assessment or advice regarding possible postpartum depression. As such, this case was referred to Public Health Nursing and the College of Registered Nurses of Manitoba for their review. The MPHSC felt that this unfortunate outcome may have been theoretically preventable.

I. A.2

This case was reviewed for antepartum maternal mortality.

This was a 27-year-old lady who suffered from depression. She was 6 months pregnant and did not seek or have prenatal care. She was found hanging in her bedroom. Her toxicology studies and alcohol studies were non-contributory on autopsy. This lady had multiple upper limb transverse scars on the front of her left forearm and there were several that appeared more recent on her right arm. These scars would have suggested possible previous attempts at suicide.

It appears there likely was a system failure in mental health support at follow up, and this lady perhaps needed socioeconomic support as well. After much discussion at the MPHSC, given lack of further information on this patient, this case was classified as theoretically preventable with system failure in the provision of mental health and socioeconomic support.

I. Preventable, Theoretically Preventable, Avoidable:
B. Maternal Morbidity

I. B.1

This case was reviewed for maternal necrotizing fasciitis.

A 29-year-old G2P0 morbidly obese lady at 335 pounds with type II diabetes on insulin and GBS positive colonization presented to the labour floor with ruptured membranes of 14 hours. She subsequently went in labour. During labour she developed fever of 38.1°C with evidence of fetal tachycardia at 2 centimeters dilation. Forewaters were felt so an ARM was done and foul smelling amniotic fluid was evident. The patient was already started on penicillin G for GBS prophylaxis. She subsequently required a caesarean section for presumptive diagnosis of chorioamnionitis. The baby was born with Apgar scores of 6 and 10 at 1 and 5 minutes. Placental pathology confirmed acute chorioamnionitis. Preoperatively she was given 3 grams of cefazolin and post-operatively 2 grams of cefazolin every 8 hours for a total of 5 doses.

On day 3 there was redness around the incision with induration, but nevertheless she was discharged home. One week later she presented to the emergency room with an excoriated incision. A diagnosis of necrotizing fasciitis was confirmed. She needed debridement of a large area of 35 x 17 x 7.5 cm of her abdominal wall.

The MPSHC felt that there were several errors in management of this patient. Penicillin G is insufficient for chorioamnionitis in labour. The patient should have been placed on a broad-spectrum antibiotic at the very least, or alternatively, should have received multi-agent antibiotic coverage. This should have been continued for a longer period of time in the post-operative period. The MPHSC also felt that discharging a patient with a red, indurated incision was an error. She should have been kept in hospital, or at the very least, sent on a prescription of oral antibiotics. The MPSHC believed that the onset of necrotizing fasciitis could have been averted. This case was classified as theoretically preventable with physician error in judgement.

I. B.2

This case was reviewed for a maternal abdominal injury and postpartum shock.

A 29-year-old G3P1 with a previous caesarean section opted for a repeat caesarean section for delivery of her second child resulting in a baby with Apgar scores of 8 and 9 at 1 and 5 minutes. At the time of caesarean section, a hematoma developed at the dome of the bladder with an area of mucosal weakening. This was over sewn with Monocryl.

Three hours after the surgery, it was noted that the dressing covering the incision was soaked. The dressing was changed. At 9 hours postpartum, the patient became hypotensive with a blood pressure of 70/30 mmHg with maternal tachycardia, decreased responsiveness, and evident hematuria. At that time, the physician ordered a CT scan. By then, her hemoglobin dropped from 112 to 73 g/L.

The CT scan showed blood in the bladder. It was at 14 hours postpartum that she was taken back to the operating room.

A bleeding bladder defect (cystotomy) was noted at the dome of the bladder. There was also active bleeding from the right angle of the caesarean incision on the uterine wall. A 750cc blood clot was found in the bladder. The bladder was evacuated. The right-angle bleeding site was controlled and then the bladder was repaired. The patient received one unit of packed cells as well as antibiotics. The Foley was kept in the bladder for two weeks and was removed following a negative cystogram.

The MPSHC classified this case as preventable at the level of obstetric care with physician error in judgement and technique. It was felt that this lady should have been taken to the operating room at 9 hours when she became hypotensive, rather than at 14 hours. Having a CT scan to get a diagnosis was unnecessary and delayed definitive treatment in the context of hemodynamic instability. An educational letter was sent to the physician involved.

I. B.3

This case was reviewed for severe postpartum hemorrhage, needing blood transfusions, and subsequent peripartum hysterectomy.

A 35-year-old G3P0 had a smooth pregnancy and presented at 40 weeks gestation with ruptured membranes. Her labour went well but she suffered bradycardia in the second stage of labour and had a vacuum delivery of the baby whose Apgar scores were 8 and 8. Subsequently, she suffered postpartum hemorrhage which was quite severe. She was treated with Syntocinon, carboprost, ergometrine and misoprostol. There were no vaginal injuries or cervical tears, but she continued to bleed and a Bakri balloon was placed in utero and the vagina was packed. This did not control the bleeding, and hence, with failed medical management, she was taken to the operating room for a laparotomy. Intraoperatively, the hemoglobin dropped to 27 mg/L and it was only then that anesthesia decided to have her transfused as a peripartum hysterectomy was carried out.

The MPHSC felt that the blood transfusion should have been managed more aggressively, even initiated in the preoperative period given the very low hemoglobin at that time. Unfortunately, the transfusion was not initiated until her hemoglobin dropped to 27 mg/L. By then a hysterectomy was already underway to control the bleeding.

On review of this case, the MPHSC was concerned that the attending anesthesiologist had left the room to initiate anesthesia for another patient for an emergency caesarean section that needed to be done at the same time, leaving the management of this patient in the hands of a fellow. The MPHSC felt that the anesthesiologist should have called their backup anesthetist to attend to the other emergency case. This would have averted the need for the anesthesiologist to leave the room and delegate the management to a fellow in training. The obstetrical management of this patient was appropriate, but the anesthesia management was of concern.

The MPHSC classified this case as theoretically preventable with in hospital error in management and physician error in judgement.

I. B.4

This case was reviewed for peripartum hysterectomy and associated ureteric injury.

A 30-year-old G4P2 lady presented at term after a smooth pregnancy. Her first pregnancy was delivered by caesarean section for a breech presenting fetus; however, she did have a VBAC in her second pregnancy, a delivery that was complicated with post-partum hemorrhage. In this index pregnancy, she wished to have a repeat attempt at a VBAC.

She presented in spontaneous labour and managed to get to full dilation without problems. Her second stage was quite long at 7 hours. The baby was in an occiput transverse position at 0 station. She had two vigorous attempts at pushing with no further descent. During these seven hours, she was offered a caesarean section on two occasions but she declined, wishing to have more time.

Ultimately, at 7 hours she gave permission to proceed with a caesarean section. The baby was born with Apgar scores of 7 and 9 at 1 and 5 minutes; however, there were bilateral extensions into the broad ligament on the left and the right as well as a long tear in the cervix. She bled two liters of blood intraoperatively and this required a subtotal hysterectomy for control of bleeding. During this surgery, there was a suspicion of possible ureteric injury on the left side. This was confirmed by a CT scan postoperatively and so she was taken back to the operating room where the urology service re-implanted her left ureter.

The MPHSC felt that the second stage was unduly protracted due to the patient's refusal of undergoing a caesarean section when this was recommended to her. At seven hours of labour the baby was quite impacted in the pelvis with significant edema in uterine tissues, which may have contributed to the tears in the broad ligament and into the cervix. The MPSHC felt the obstetrical management was appropriate and the ureteric complication was managed well. This case was classified as theoretically preventable with patient error in judgement in refusing to give permission to proceed with a caesarean section at an earlier appropriate time.

I. Preventable, Theoretically Preventable, Avoidable:
C. Perinatal Mortality

I. C.1

This case was reviewed for a stillbirth.

A 32-year-old G8P5 lady developed cholestasis of pregnancy at around 34 weeks gestation. She had global itching with elevation of her liver transaminases and bilirubin. She was placed on induction of labour at approximately 37 ½ weeks gestation. The induction was delayed due to resource issues at the centre where induction was supposed to take place. Six days later she was still not induced, but she presented at 38 ½ weeks gestation to the labour floor with contractions and decreased fetal movements. Fetal death was confirmed. Labour was augmented.

The MPHSC felt that there was no criticism of the patient's care. She was placed on induction of labour at an appropriate time; however, resource issues at the tertiary centre contributed to this fetal death. As a result, a critical incident report was filed for failure to get this patient in for delivery at the appropriate time. This case was classified as theoretically preventable with resource issues as the causative factor.

I. C.2

This case was reviewed for a stillbirth.

A 23-year-old G1P0 lady developed gestational hypertension at 36 weeks gestation. She was seen by her family physician at approximately 37 weeks gestation at which time her blood pressure readings were recorded as 144/107 mmHg. A repeat blood pressure done during the same visit showed a blood pressure of 153/96 mmHg. Proteinuria at +1 was noticed in the clinic and hence a diagnosis of pre-eclampsia was made. The family physician sent the patient for lab work, including renal functions, liver functions, and platelet counts, the results of which came back as being within normal parameters. She was then sent home without medications to lower her blood pressure or a booking for a fetal assessment scanning or doppler analysis or a consultation to an obstetrical specialist.

She was brought back to the clinic three days later to reassess her blood pressure and at that time no cardiac activity of the fetus was noted and fetal demise was diagnosed. She was subsequently sent to a tertiary centre for induction of labour.

The MPHSC felt that the management of this case did not meet standards in management such as being initiated on antihypertensive agents and booked for assessment of the fetal status. An induction of labour should have been planned for. The family physician admitted the error in management and has subsequently reviewed the national guidelines for the management of hypertensive disorders of pregnancy. This case was classified as theoretically preventable with physician error in judgement.

I. C.3

This case was reviewed for a stillbirth.

A 34-year-old G4P2 lady had a relatively smooth pregnancy until 35 weeks gestation when she started to demonstrate evidence of gestational hypertension. In the second trimester, her blood pressure was 110/70 mmHg. At 35 weeks gestation blood pressure crept up to 140/85 mmHg and at 36 weeks gestation her blood pressure went up to 145/86 mmHg. She was started on Labetalol 100 mg BID, but two days later her blood pressure in the community was 194/111 mmHg. She was admitted to hospital for a two-day observation.

Her pre-eclampsia workup was negative and she was sent home on the same dose of Labetalol. On subsequent office visits her blood pressure was 140/90 mmHg at 38 weeks. At no time during her hospital stay and before or after her admission was a fetal assessment scanning performed for placental functions and doppler studies or was a biophysical score done.

She presented to triage at 39 weeks and 6 days gestation with an absence of fetal heart tones and a scan confirmed fetal demise. The baby was noted to be growth restricted with size consistent with 34 weeks gestation as well as absolute oligohydramnios. She was induced and the baby weighed 1930 grams. The placental pathology showed chronic villitis. Autopsy was declined. The rest of the stillbirth workup was negative.

The MPHSC felt that this patient's assessment was deficient with the absence of fetal assessment scanning and doppler studies of the placenta. Had an assessment been arranged, the growth restriction would have been noted and the patient would have probably been induced much earlier. This case was classified as theoretically preventable at the level of obstetric care with physician error in judgement. An educational activity took place with the physician involved.

I. C.4

This case was reviewed for a stillbirth.

A 35-year-old G5P3 lady had a previous fetal demise 8 years earlier at 35 weeks gestation in her first pregnancy. In the current pregnancy, an early ultrasound for fetal anatomy showed a two-vessel cord. She was followed regularly through antenatal care, but at 35 ½ weeks gestation she presented with decreased fetal movements to the triage area. A non-stress test showed a two-minute deceleration, with recurrent subtle decelerations. There were no accelerations. The resident house staff interpreted the non-stress test as being normal. Allegedly this non-stress test was discussed with the attending involved; however, there is no documentation that the attending had actually seen the tracing. The patient was sent home with the assumption that the non-stress test was normal.

A few days later she attended a routine perinatal appointment, at which time a fetal heart rate could not be auscultated and fetal demise was diagnosed. She was admitted to the labour floor where she was induced with misoprostol and had a vaginal delivery. The baby was significantly growth

restricted with a birth weight of 1900 grams and a placental weight of 330 grams. An autopsy was declined.

The MPSHC felt that there was a physician error in judgement in that the standard of care for the detection of a two-vessel cord on an anatomy scan in early second trimester should have triggered routine repeated fetal assessments as this finding is associated with growth restriction and possible anomalies. At the very least, she should have had a fetal assessment scanning at 32 weeks gestation. Equally, when this patient presented with decreased fetal movements, the non-stress test done to assess fetal wellbeing was abnormal and was misinterpreted by the house staff as being normal. Such a tracing should have warranted intervention such as delivery, or, at the very least, a fetal assessment scanning. The attending physician and house staff were sent educational letters. This case was classified as theoretically preventable at the level of obstetrical care with physician error in judgement and in hospital error in management.

I. C.5

This case was reviewed for a stillbirth.

A 38-year-old G8P4 lady presented at 33 weeks gestation in labour. She was fully dilated at presentation, but the fetus was dead. She had a stillborn male weighing 1570 grams. Placental pathology showed multiple infarcts. This case was followed up by a family physician who, on further review by the MPSHC, first saw this patient at 23 weeks gestation and arranged for an ultrasound to be done at one of the tertiary centres. It was the expectation that this ultrasound be done within a very short period of time given that this lady was already at 23 weeks gestation. Unfortunately, this lady did not get her ultrasound done until 7 weeks later at 31 weeks gestation, at which time the ultrasound showed severe oligohydramnios.

These findings were not relayed by the radiologist to the family physician involved and the family physician received the sonography report several days later, at which time, he immediately tried to refer this patient to an obstetrician specialist who was not able to see the patient until two weeks later. She presented at 33 weeks gestation with a stillbirth.

The MPHSC felt that the family physician tried his best to refer the patient to an obstetrician specialist, but given the delay in the appointment with the specialist, other alternative routes could have been explored, such as sending the patient to a triage at one of the tertiary centres or call upon one of the 24-hour obstetrical specialists on-call at one of the tertiary centres so that this patient could have been seen much earlier.

The MPHSC noted that there was an error in judgment and communication by the radiologist who did the ultrasound. The radiologist had an onus to call the family physician of the findings immediately upon performance of the ultrasound given the gravity of the situation so that the family physician could have referred the patient to specialty care in a timely manner. Both the family physician and the radiologist received educational letters from the committee.

This case was classified as theoretically preventable with physician error in judgement and error in communication.

I. C.6

This case was reviewed for a stillbirth.

This case involved a 25-year-old G5P3 lady whose children in the past had been apprehended and placed in foster homes. She had a history of alcohol and opiate abuse and did not initiate prenatal care in this current pregnancy. She presented at 37 weeks gestation to the labour floor with a five-day history of nausea, back pain, and decreased fetal movements. A fetal heart rate could not be auscultated. She was induced with misoprostol and at the time of artificial rupture of membranes, bloody amniotic fluid was noted, consistent with an abruption. Of note, this lady has had a previous abruption in a prior pregnancy. The autopsy demonstrated hypoxic ischemic encephalopathy.

The MPHSC felt that there was a system failure in the provision of mental health and socioeconomic support of this patient who was well known to the system. She could have been encouraged to seek prenatal and care and have her history of alcohol and opiate abuse dealt with. The MPHSC classified this case as theoretically preventable with system failure in the provision of mental health and socioeconomic support.

I. C.7

This case was reviewed for a neonatal death. A 23-year-old G5P4 lady had no prenatal care called an ambulance because of contractions. She told the paramedics that she estimated she was in her 5th month of pregnancy at that time. She was taken by ambulance to a primary hospital in the Winnipeg. It took two hours for her to be seen and after being assessed, at which time she was 4 centimeters dilated, spontaneous rupture of membranes occurred. She was then rushed to a tertiary centre and upon arrival, frank abruptio occurred and she was beyond 4 centimeters dilated.

She underwent a crash caesarean section for delivery of a 1000 gram baby, which suggested she was further along than what she initially thought. Apgar scores were 2 and 5 at 1 and 5 minutes. Neonatally, the baby suffered hypoxic ischemic encephalopathy with grade IV IVH and intractable metabolic acidosis. Subsequently, care was withdrawn and the baby died.

The MPHSC felt that this outcome could have been prevented through appropriate prenatal care. Had this patient sought prenatal care, the exact gestational age could have been determined and she would have been taken to the appropriate hospital by the ambulance services from the beginning, avoiding undue delay in her management and the ultimate occurrence of clinical abruption and the need for a crash caesarean section. This case was classified as theoretically preventable with patient error in judgement due to not seeking prenatal care.

I. C.8

This case was reviewed for a neonatal death.

The mother was a G1P1 who was a smoker who did not seek prenatal care. At 27 weeks gestation, she went into preterm labour and spontaneously delivered a breech baby. Unfortunately, there was head entrapment at the delivery of the breech. The delivery occurred at home, and the head was delivered in the ambulance on transit to the hospital. The baby's Apgar scores were 0, 0, 0, 2 at 14 minutes, with the baby weighing 1400 grams. The baby was kept on life support, but started to have convulsions. Assessment of the newborn showed profound metabolic acidosis and profound hypoxic ischemic insult. Comfort care was given and the baby died a week later.

The MPHSC classified this case as theoretically preventable with patient error in judgement. Had the patient sought prenatal care, this case may have turned out differently.

I. C.9

This case was reviewed for a stillbirth.

A 21-year-old G1P0 lady was diagnosed with gestational diabetes which required insulin for blood sugar control. The patient was non-compliant with her insulin dosing and as a result, her diabetic control did not meet standards with recorded blood sugars consistently above 10 mmo/L. She also missed several appointments for care. She presented at 36 weeks gestation with a stillbirth. Labour was induced. Her glycosylated hemoglobin was 8.6%.

The MPHSC classified this case as theoretically preventable with patient error in judgement as a causative factor for this diabetic fetopathy and stillbirth.

I. Preventable, Theoretically Preventable, Avoidable:
D. Perinatal Morbidity

I. D.1

This case was reviewed for severe neonatal acidosis with a near-miss for long term neonatal damage.

A 43-year-old lady with two previous caesarean sections had a BMI of 58 and was noted to suffer from gestational diabetes during pregnancy. She refused to take insulin and was instead given metformin. She had a previous history of a macrosomic infant of 11 lbs. She was booked for an elective caesarean section at 38 weeks gestation, but at 37 weeks gestation she presented to her home community hospital with spontaneous rupture of membranes and was transferred to one of the tertiary centres in the city.

At that time, she was noted to be actively laboring with a cervix at 5 centimeters dilation, but the baby was in an oblique breech presentation. Thick meconium was noted. Unfortunately, there were no neonatal beds in the NICU at the tertiary centre, so it was decided to transfer the woman to the second tertiary centre in the city. Once she arrived at the second tertiary centre, she was observed for 90 minutes before a decision was made to transfer her to the operating room.

In the operating room, it took the anesthesiologist some time to give her an appropriate spinal anesthetic given her body habitus. The baby was delivered one hour later. It was note that for at least an hour and a half prior to delivery of the fetus there was no fetal heart rate monitoring.

The caesarean section went well and the baby weighed 5190 grams, but was severely acidotic. The Apgar scores were 1 and 7 at 1 and 5 minutes with an umbilical arterial pH of 6.78 and a PC02 of 139 with a base deficit of 14. This baby suffered mixed metabolic and respiratory acidosis. The baby needed positive pressure ventilation and then a course of CPAP. The baby did quite well despite the severe metabolic acidosis.

The MPHSC felt that this was a near-miss situation. Firstly, it was felt that the transfer of this patient to the second tertiary centre because of the unavailability of NICU beds was inappropriate given the patient's body habitus, two previous caesarean sections, and quite actively laboring at 5 centimeters dilatation. Thankfully, no catastrophic consequences developed during the transfer.

The second concern was the absence of fetal heart rate monitoring of this fetus for at least 90 minutes prior to delivery while being transferred to the operating room and thereafter when the anesthesiologist was trying to perform an adequate spinal anesthetic. Intermittent monitoring of this fetus would have been indicated and may have forced expeditious delivery.

This case was classified as theoretically preventable at the level of obstetrical care with physician error in judgement and in hospital error in management.

I. D.2

This case was reviewed for neonatal asphyxia with hypoxic ischemic encephalopathy.

A 32-year-old G2P1 lady was at 33 weeks gestation. Her pregnancy was otherwise uneventful. She did have elevated alpha-fetoprotein in the pregnancy which was followed up by fetal assessment. At 33 weeks, she was noted to have a blood pressure of 180/120 mmHg. She was given 200 mg of Labetalol and one bolus of 10 mg of IV hydralazine in the triage area and was noted to be 3 centimeters dilated. A decision for induction was then undertaken.

The observation time in the triage area was in excess of 50 minutes with a fetal heart rate tracing that was showing recurrent late decelerations with loss of variability. She was then taken to the labour floor where an artificial rupture of membranes was done. Amniotic fluid was bloody. This was soon followed by severe bradycardia and an emergency caesarean section under general anesthetic was done.

The baby was 1670 grams with Apgar scores of 0, 0 and 2 at 1, 5 and 10 minutes. The arterial cord pH was 6.68 with a base deficit of 28. This baby suffered hypoxic ischemic encephalopathy and showed convulsive activity with an abnormal EEG. The baby spent 82 days in the NICU.

The MPHSC reviewed the tracing in full and there were late decelerations with loss of variability throughout the period of observation in triage and on the labour floor before the artificial rupture of membranes was done. This was felt to have been inappropriately prolonged and it was felt that a caesarean section should have been called much earlier. The delay may have contributed to the severe acidotic state of the newborn. The MPHSC was also concerned with the management of hypertension. The diastolic blood pressures remained between 120-130 mmHg, despite the IV hydralazine and the one does of Labetalol. A more aggressive approach would have been warranted for this severe degree of hypertension. It was felt that this outcome could have been theoretically preventable at the level of obstetrical care with physician error in judgement in the management of both hypertension and the abnormal fetal heart rate tracing. An educational letter was sent to the attending physician involved.

I. D.3

This case was reviewed for neonatal morbidity and admission to the NICU for severe neonatal acidosis and persistent pulmonary hypertension.

A 33-year-old G1 lady presented at 40 weeks gestation with late onset gestational hypertension. She had a BMI of 44. She was admitted to the triage of a tertiary centre and was at 1 centimeter dilation. A fetal heart rate tracing showed evidence of late onset decelerations. A decision for a caesarean section was undertaken. Unfortunately, from the time of the decision and subsequent transfer until delivery by caesarean section, more than 50 minutes passed, during which the fetus was not monitored at all.

The baby was born flat with severe acidosis and with an arterial cord pH of 6.97 and a base deficit of 21. The baby needed intubation, admission to NICU, and was subjected to a cooling protocol. The baby developed persistent pulmonary hypertension and stayed in the NICU for 18 days.

The MPSHC felt that the outcome of this baby was theoretically preventable at the level of obstetrical care with in hospital error in management. It was felt that leaving a fetus unmonitored during preparations for a caesarean section for more than 50 minutes was inappropriate given that the fetal heart rate tracing prior to the decision for caesarean section was abnormal. Such monitoring may have resulted in a more expeditious delivery of this fetus. Educational activity took place with the nursing staff at the tertiary centre regarding the need for continuous electronic fetal monitoring of a fetus in the interval between the decision to perform a caesarean section until the actual delivery of the fetus.

I. D.4

This case was reviewed for poor Apgar scores and admission to NICU.

A 19-year-old G1 lady known to have branchiootorenal syndrome with deafness had a smooth pregnancy and presented in active labour at 39 weeks gestation. Five hours prior to delivery she underwent an artificial rupture of membranes following which fetal tachycardia set in; however, this was associated with recurrent variable decelerations, followed by late decelerations closer to delivery. The mother had a temperature of 38.5°C. She was already receiving penicillin G for GBS prophylaxis. She had a normal vaginal delivery but the baby was depressed at birth with Apgar scores of 3 and 5 at 1 and 5 minutes. The baby required PPV followed by intubation. The intubation was done twice as it was unsuccessful the first time. The baby was subsequently transferred by the transport team to a tertiary centre NICU.

On further review of the case, the MPHSC was concerned with two issues; the first was a delay of intervention when late decelerations were noted approximately more than an hour prior to delivery. This neonatal outcome could have been prevented through an assisted vaginal delivery done much earlier. The second issue was the choice of antibiotics when fever suggestive of chorioamnionitis had set in. Penicillin G is not the appropriate antibiotic for treatment of possible chorioamnionitis. A broader spectrum antibiotic or multi agent antibiotics would have been much more appropriate to administer

The MPHSC classified this case as theoretically preventable at the level of obstetric care with physician error in judgement.

I. D.5

This case was reviewed for neonatal seizures.

A 25-year-old G1P0 presented at 41 weeks gestation in active labour. Her first stage was complicated by intermittent episodes of variable decelerations which evolved into late decelerations in the late first stage of labour. These became recurrent. She then entered the second stage of labour and stayed undelivered for 4 ½ hours, during which the fetal heart rate tracing was showing persistent recurrent late decelerations with loss of variability. After 4 ½ hours, the physician decided to perform an assisted vaginal delivery through vacuum extraction. The vacuum was applied twice but extraction failed, so an emergency caesarean section was done. The baby had Apgar scores of 1 and 5. No cord pHs were obtained. The baby was flat at birth and was not breathing. There was an attempt at intubation on four occasions but these failed. The baby stayed in the nursery for 8 days and was sent home.

At home, the baby started to show signs of neonatal seizures and was brought back to the hospital where seizures were documented. The baby was in turn transferred to a tertiary centre.

The MPHSC reviewed the fetal heart rate tracing in the first and second stage of labour, and it was felt that the delivery should have been expedited much earlier in the second stage given the nature of the fetal heart rate tracing. This case was classified as theoretically preventable with physician error in judgement. Educational activity took place with the physician involved.

I. D.6

This case was reviewed for neonatal acidosis and need for intubation and admission to the NICU.

A 29-year-old G1 lady known to have a breech presentation with the breech size being on the 25th percentile for gestational age, wished to have a trial of vaginal birth. At 41 weeks gestation, she presented with spontaneous rupture of membranes. An ultrasound was done of the fetus, again, confirming the size of the fetus on the 25th percentile for gestational. It was a frank breech with a flexed neck. As she was not in labour, she was sent home.

Many hours later she was admitted for induction with oxytocin. During the first stage of labour, variable decelerations were noted but the baseline was normal. Variability was preserved. The first stage of labour was 14 hours with the last few hours showing significant variable decelerations. The second stage was more than 3 hours long during which variable decelerations were noted to be of moderate intensity, but the baseline was in the tachycardia range at 170 bpm. The fetal heart rate tracing evolved into severe variable decelerations with upward swings to 180 bpm in the last half hour. The baby was delivered vaginally and had Apgar scores of 3 and 4 at 1 and 5 minutes, with an umbilical arterial pH of 6.86 and a base deficit of 22. The baby needed ventilation and subsequent intubation and was admitted to the NICU.

The MPHSC felt that the attempted vaginal breech delivery exceeded acceptable boundaries. Had this baby been cephalic, assisted delivery with forceps would have been done more than one hour earlier to the actual time of birth given the abnormal fetal heart rate tracing. With a breech, the only recourse a physician has is a caesarean section when the fetal heart rate tracing becomes ominous. This was not done. The overall picture of evolving and worsening metabolic acidosis was missed. This case

was classified as theoretically preventable at the level of obstetrical care with physician error in judgement. An educational letter was sent to the physician involved.

I. D.7

This case was reviewed for low Apgar scores at birth and substandard communication issues.

A 17-year-old G1 lady was known to have gestational diabetes which was diet controlled, presented at 38 weeks gestation for a non-stress test. The non-stress test was abnormal in that there was fetal tachycardia. A full resuscitation with intravenous and positioning was done. The cervix was noted to be 5 centimeters dilated. It was opted to proceed with induction of labour. The fetal heart rate was initially normal and tachycardia settled.

Later in the first stage of labour, there were pronounced variable decelerations with loss of variability. These findings were not passed to the obstetrician. The baby did not deliver for a couple more hours after the onset of these severe variable decelerations. The electronic monitoring did not pick up contractions at the time of the vaginal delivery. The baby was born with Apgar scores of 1 and 5 at 1 and 5 minutes, with an arterial cord pH of 7.17. The baby weighed 3850 grams.

The MPHSC noted that the nursing staff did not communicate with the attending physician on call. The outcome could have been much worse. Educational activity took place with the staff involved. This case was classified as theoretically preventable with in hospital error in management.

I. D.8

This case was reviewed for neonatal asphyxia and neonatal seizures. A 37-year-old primigravida was at 41+ weeks gestation. She wished to deliver under the care of midwifery. She was seen by an obstetrics specialist at 34 weeks gestation once for a predelivery screening. At 40 ½ weeks gestation she presented in desultory labour and she underwent external fetal monitoring which showed what was thought to be three variable decelerations. She was offered induction of labour but she declined at that time. Five days later she presented in active labour, and at this time, external fetal monitoring showed a pattern of definite late decelerations. She was offered augmentation which she declined again.

She continued being monitored, but this ended in a terminal bradycardia for which a crash caesarean section was done. The baby's Apgar scores were 0, 0, 2 at 1, 5 and 10 minutes. The baby suffered neonatal seizures and multisystem dysfunction. The baby's MRI showed left-middle cerebral artery infarct and the baby stayed in the NICU until day 29 after which the baby was discharged home.

Upon review of the fetal heart rate tracing and the events in labour, the initial tracing that was done when she presented in desultory labour in fact showed late decelerations not variable decelerations, and an induction of labour should have been strongly suggested to the patient. On her second admission, the tracing was very poor with recurrent late decelerations and a caesarean section

should have been offered assertively, rather than offering her augmentation, which incidentally the patient declined as well.

The MPHSC classified this case as preventable at the level of obstetric care with a combined physician error in judgement, in hospital error in management, and patient error in judgement. The causative factors of physician error in judgement and in hospital error in management are due to the error in assessing the fetal heart rate tracing on her first admissions to triage. What was thought to be variable decelerations were in fact late decelerations and an induction should have been assertively recommended with counselling. Equally, as this patient refused induction of labour and/or any other intervention to facilitate delivery, there is also an element of patient error in judgement. Educational letters were sent to the attendings involved and to the Chair of the hospital standards committee.

I. D.9

This case was reviewed for neonatal morbidity and admission to a tertiary NICU.

A 30-year-old primigravida presented at 36 weeks gestation in active labour. She had no prenatal care. On admission, the fetal heart rate was within normal range of about 150 bpm, but the variability was reduced. There were no decelerations. Clinically, the height of fundus was felt to be small so an ultrasound was ordered and this documented that this fetus was growth restricted and the doppler studies of the umbilical artery showed reverse end diastolic flow. As such an urgent caesarean section was done. The baby had Apgar scores of 1 and 5 at 1 and 5 minutes. The baby needed to be intubated and was later transferred to a tertiary NICU.

The growth restriction as well as the placental insufficiency and increased placental resistance could have been detected much earlier had this patient sought prenatal care. The MPHSC felt that the neonatal acidosis and placental insufficiency could have been detected much earlier and the outcome averted. This case was classified as theoretically preventable with patient error in judgement.

II. Non-Preventable and Unavoidable:
A. Maternal Mortality

II. A.1

This case was reviewed for a maternal mortality. A 26-year-old primigravida known to be a type I diabetic since childhood was at 10 weeks gestation when she was found unresponsive lying on her bed at home. Her boyfriend was out of town at the time. He tried to reach her many times with no response. The patient was alone and no resuscitation was possible. The medical examiner pronounced her dead at her residence.

She had a past medical history of remote substance abuse and she was currently a smoker. Toxicology proved to be negative and an autopsy showed active lymphocytic myocarditis. The autopsy also confirmed the 10-week gestational period. There were no other significant illnesses. A prenatal assessment was done by an obstetrician 3 days prior to death on her first prenatal visit and a full heart and lung examination was carried out. There were no clinical signs of impending problems at that time.

The MPHSC classified this very unfortunate case as non-preventable and unavoidable.

II. A.2

This case was reviewed for a maternal mortality. A 36-year-old G2P1 died by hanging six months after delivery of her second child. This lady had a history of psychiatric adjustment disorders as well as a history of substance abuse, particularly alcohol. She had been followed up closely by two psychiatrists for many visits over more than 3 years prior to her death. She was treated medically with Effexor. There were several past attempts at suicide. There was documentation of many missed visits to a psychiatrist despite calls by the psychiatry clinic to have her attend assessment and management.

It was noted that when she was sober, her insight into her problems was appropriate and she did seek medical care; however, when she was under the influence of alcohol, she would lose insight into her psychiatric needs and tended to become non-compliant with care.

The MPHSC reviewed the records and felt that the death of this lady was non-preventable and unavoidable given that she was offered excellent psychiatric support and help, but unfortunately, she was unable to control her substance abuse.

II. Non-Preventable and Unavoidable:
B. Maternal Morbidity

II. B.1

This case was reviewed for a uterine rupture.

A 31-year-old G6P5 whose previous deliveries were all normal vaginal deliveries, had a smooth pregnancy and presented in active labour at term. During labour she needed some augmentation with oxytocin. Oxytocin was increased until she got to 20 milliunits per minute. Hypertonus was noted, so the oxytocin was cut back to 10 milliunits per minute by her attending physician and was kept on that dose until delivery.

Delivery was smooth, but she was suffered postpartum hemorrhage. This was treated medically. Her hemoglobin dropped from 91 to 47 grams per liter, at which time she was transfused. She underwent an examination under anesthesia and there was a cervical tear that was repaired and a Bakri balloon was inserted in utero. She kept on bleeding so she was taken to the operating room where an exploratory laparotomy was performed. There was retroperitoneal hematoma noted. This was observed for some time in the operating room and the hematoma did not expand. No further intervention was felt to be needed, so she was sent back to the recovery room.

In the recovery room, she continued to bleed. She was taken back to the operating room for a second time for an exploratory laparotomy and possible hysterectomy. At that time a uterine rupture was detected in the lower uterine segment.

The MPHSC felt that the management was appropriate and timely. There was no undue delay in her management. The case was classified as non-preventable and unavoidable.

II. B.2

This case was reviewed for a maternal morbidity of a caesarean section complicated by a peripartum hysterectomy and blood transfusions.

A 32-year-old G2P1 lady with a previous caesarean section wished to have a trial of labour. At 39 weeks gestation, she had spontaneous rupture of membranes and she progressed from 2 centimeters to full dilatation. She had to be augmented in the second stage of labour due to failure of descent. Subsequently, she underwent a trial of vacuum extraction under a double setup technique. The trial of vacuum failed after two pulls and three popoffs, after which a caesarean section was done. The baby had Apgar scores of 1 and 7 at 1 and 5 minutes with an arterial cord pH of 7.04. The baby was sent to the NICU.

The fetal heart rate tracing did not indicate the need for an earlier intervention. The management was felt to have been appropriate. In the recovery room, the patient developed

hypotension of 80/40 mmHg with maternal tachycardia. She was then taken back to the operating room in an expedited manner and a right broad ligament hematoma was diagnosed that required treatment by a subtotal hysterectomy. The patient was transfused with 8 units of blood. Following that second surgery, she developed bleeding from the incision and was taken to the operating room for a third time. No active bleeders could be found at that time.

The MPHSC felt that the management of this case met standards and the responses were appropriate given the circumstances. This case was classified as non-preventable and unavoidable.

II. B.3

This case was flagged for reviewed for a uterine rupture; however, it appears that there was no uterine rupture but there was an extension of a caesarean incision into the right angle. There was no significant maternal morbidity, but review of the case revealed some important issues in management and communication which the MPHSC felt important to share.

A 24-year-old G2P1 lady had a smooth pregnancy. She had a previous normal vaginal delivery and a very quick second stage of labour. Her pregnancy under review was postdate at 42 weeks gestation. As such, it was decided to have her induced with Cervidil as the cervix was not very favourable. Within 11 hours of Cervidil, she went into active labour and she was noted to be 4 centimeters dilated at which time the Cervidil was removed. The fetal heart rate while initially normal, deteriorated after removal of the Cervidil. Late decelerations were noticed with onset of fetal tachycardia. This fetal heart rate tracing became worse with time and the resident was summoned to assess the patient.

The resident placed a scalp clip for intermittent fetal heart rate monitoring. Thick meconium was observed. The patient received nasal oxygen and then changed positions. The primary attending was called and came in an hour after the onset of the abnormal fetal heart rate tracing. At that time, there were concerns that this patient needed to be delivered by caesarean section given that she did not progress beyond 7 centimeters dilation in context of an abnormal fetal heart rate tracing.

Unfortunately, the surgeon that was on call would not respond to the calls. He was called more than four times. Other surgeons were also called in an attempt to reach someone who would perform a caesarean section.

Finally, one of the surgeons came in to do the caesarean section as the patient was being wheeled to the operating room. This was nearly two hours from the onset of the abnormal fetal heart rate tracing. By then the tracing was quite ominous. A caesarean section was undertaken and the baby was delivered twenty minutes later with Apgar scores of 6 and 8 at 1 and 5 minutes, through thick meconium. At the time of delivery, the baby's presentation was a breech (? switched from cephalic) so a total breech extraction was carried out at caesarean section. Fortunately, both the mother and baby did well.

The MPHSC felt that this case raises issues of concerns in communication and being prepared for an emergency situation by sequestering the services of a surgeon well ahead of time. It was uncertain

why the surgeon on call did not respond. There may have been issues with the pager. Thankfully, another surgeon stepped in. Also, no cord pHs were obtained.

The MPHSC felt that this was a near miss.

II. Non-Preventable and Unavoidable:
C. Perinatal Mortality

II. C.1

This case was reviewed for a neonatal death.

A 28-year-old primigravida was at 41 weeks gestation. She had a fetal assessment that was felt to be normal one day prior to her admission for decreased fetal movements. Upon admission to the hospital, the NST was commenced but there was reduced variability with late decelerations. She was taken to the labour floor where a three-minute deceleration was noted with no further deterioration. An ARM was performed just prior to two hours after admission. Thick meconium was noted.

The decision was made to have her deliver by caesarean section and the baby was delivered within 18 minutes under general anesthetic. The baby's Apgar scores were 1, 5 and 7 at 1, 5 and 10 minutes. The venous pH was 7.22. There were no arterial cord samples, but the first neonatal gas was 6.9. The baby had profound lactic acidosis and subsequent hypoxic ischemic encephalopathy. Care was subsequently withdrawn and the baby passed away.

This case represented a stillbirth in evolution. The fetal heart rate tracing was abnormal from the time of presentation, indicating that the baby was likely to have been acidotic on admission. The tracing did not deteriorate over the time that the mother was observed and the period of observation was not felt to be excessive. The MPHSC felt that the care was appropriate. The neonatal death, while unfortunate, was classified as non-preventable and unavoidable.

II. C.2

This case was reviewed for a neonatal death.

A 26-year-old G4P1 lady who had a previous normal vaginal delivery decided in this pregnancy to deliver at a birthing centre. She had a spontaneous labour and presented to the birthing centre at 1720 hours at which time the midwife detected a fetal heart rate of 80 bpm. An ambulance was summoned and the patient was transferred to a tertiary centre within 20 minutes. Upon arrival to the hospital, the fetal heart rate was at 30 bpm. A crash caesarean section was carried out within 6 minutes of arrival. The baby was born with Apgars of 0 at 1, 5 and 10 minutes, but had 1 at 15 minutes followed by 0 at 20 and 25 minutes. Resuscitation was unsuccessful.

The MPHSC felt that the patient had a very short period of time between arrival to the birthing centre and the actual caesarean section that was performed at the hospital, which was about 46 minutes. Considering that a transfer was required, this was a very rapid response. While unfortunate, this case was classified as non-preventable and unavoidable. This case was referred to the College of Midwives of Manitoba for their review as well.

II. C.3

This case was reviewed for a neonatal death. An 18-year-old G1P0 mother was referred by a nurse practitioner to an obstetrician specialist where she was seen on three occasions at 21, 26 and 31 weeks respectively. Her past medical and surgical history was essentially negative except for her being a smoker and admitted to the use of marijuana. She was also diagnosed with chlamydia infection, for which she was treated with Zithromax.

At 31 weeks, there was a concern by the obstetrician that the height of fundus was lower than what is expected for the mother's gestational age, so an urgent fetal assessment was done. The fetal assessment showed adequate normal growth, normal dopplers, and normal amniotic fluid. She was not seen by the obstetrician after that time.

She presented at 34 weeks and 5 days gestation in active labour and delivered spontaneously of a live male baby with Apgar scores of 9 and 9, weighing 2180 grams. Three days into the neonatal period, the baby became tachypneic and there was blood in the stools. The baby was diagnosed with signs and symptoms of prematurity and associated complications of necrotizing enterocolitis, E. coli sepsis, and subsequently developed DIC, neutropenia, thrombocytopenia and anemia. The baby subsequently developed acute renal failure and the condition continued to deteriorate. Withdrawal of support ended in neonatal death.

This lady's blood pressure had been normal, there was no evidence of diabetes. It is uncertain how much the substance abuse may have contributed to this neonatal death; however, the pediatric assessment suggested this neonatal death was a complication of prematurity confounded by sepsis. There were no errors by the specialist or in pediatric care. The case was classified as non-preventable and unavoidable.

II. C.4

This case was reviewed for neonatal death. A 25-year-old G1 with a smooth pregnancy presented at 41 weeks gestation in active labour. Electronic fetal monitoring showed decreased fetal heart variability without presence of accelerations, but there were no decelerations during labour. At one point of her labour EFM was disconnected and she was switched to intermittent auscultation so that she might have a shower. Intermittent auscultation of the fetal heart rate was recorded 14 minutes later and was documented to be at 145 bpm. As per protocol, a repeat fetal heart rate was recorded, but was at 100 bpm which subsequently dropped to 80 bpm within a very short period of time. The mother was rushed to the labour floor for an emergency caesarean section which was done within 20 minutes.

The baby was born flat at birth and had Apgar scores of 0 at 1, 5 and 10 minutes, and then a score of 1 at 13 minutes. The cord arterial pH was at 6.86 with evidence of metabolic fetal acidosis. An MRI done on the second day demonstrated neurologic damage to the fetal brain. Life support was withdrawn on the 4th day of life.

The MPHSC debated on whether the fetal heart rate monitoring should have been continuous given that the initial tracing showed lack of variability and absence of accelerations. Instead the

monitoring continued as intermittent auscultation. On discussion, it was felt that the intermittent monitoring was performed diligently and the fetal bradycardia was detected promptly and a caesarean section was done within a very short period of time after the slow fetal heart rate was detected. It is likely that the fetus was already in acidosis prior to labour given observed variability and absence of accelerations on admission. This outcome was classified as non-preventable and unavoidable.

II. C.5

This case was reviewed for neonatal death.

A 22-year-old primigravida who had some chronic bleeding until 21 weeks gestation. At 21 weeks gestation, she suffered premature rupture of membranes and a month later at 25 weeks she went into spontaneous labour and delivered vaginally. The newborn initially did well on CPAP but subsequently required 80% oxygenation so it was decided to intubate the baby.

An initial x-ray done after the intubation suggested that the endotracheal tube was high in the trachea and it was advanced slightly. Surfactant was injected through the endotracheal tube but this produced fetal bradycardia. The baby was reintubated and the rest of the Surfactant dose was given but bradycardia occurred again. The baby was reintubated for the third time but developed a left pneumothorax. Two hundred cc of air was aspirated from the left lung. Bradycardia occurred again, and the baby could not be resuscitated. Death occurred at 2 hours 20 minutes after birth.

Discussion by the MPHSC suggested that probably the pneumothorax was the result of a tracheal injury. Unfortunately, an autopsy was declined. Tracheal injuries are more common in babies that are very premature especially with repeated intubations. The MPHSC felt that this complication and resultant death was non-preventable and unavoidable.

II. C.6

This case was reviewed for a stillbirth. A 27-year-old G1P0 had a smooth pregnancy with no evidence of hypertension or diabetes, but with a BMI of 39, presented to a clinic visit at 39 weeks gestation with no fetal heart rate. She underwent an ultrasound which showed the baby to be small on the 10th percentile on the growth curve. There was also evidence of a right pleural effusion. Amniotic fluid volume and appearance were normal. This lady was induced and delivered a stillbirth that was 2700 grams. The pathology showed placental insufficiency with placental infarcts.

It appears that the clinical picture of a small for gestational age was missed by the physician because of her obesity. The physician was advised that in obese patients, fetal assessment scans are highly recommended to confirm adequacy of growth as the clinical measures of growth lose accuracy with such body habitus. Of note, during labour, she showed evidence of hypertension for the first time during that pregnancy.

The MPHSC felt that there was no error in management by the physician; however, a letter of education was sent to the physician stressing that estimation of clinical fetal growth may be inaccurate and under-or-over-estimated in patients with a high BMI. Offering such patients a routine 3rd trimester fetal scan to confirm growth and ensure normal doppler studies of the placental and umbilical flow is suggested for a more accurate assessment.

II. C.7

This case was reviewed for a stillbirth of term.

A 37-year-old lady, primigravida, was noted to have mild pre-existing hypertension in early pregnancy and was placed on labetalol. Late in the second trimester, the antihypertensive agents were stopped as her blood pressure was normal. She was discovered to have gestational diabetes which was controlled by diet.

At 39 weeks gestation, she was noted to have an increase in her blood ranging between 130/80 to 150/90 mmHg. Labetalol in a dose of 200 mg PO BID was started and she was offered induction of labour, but the patient wished to wait another 4 days, hoping for spontaneous labour. Pre-eclampsia workup was requested; however, as she lived out of town, she had these tests done in a rural hospital. The tests were only partially done, and were lacking levels of liver function tests and urine for proteinuria. Equally, the results of high creatine and uric acid were not relayed to the attending physician.

Unfortunately, she returned two days later after her clinic visit with no fetal movements and fetal demise was confirmed. Of note is that this lady's serum screening for aneuploidy was positive for Trisomy 21 at 1 chance in 80. She was referred to genetics but amniocentesis was declined. At the time of fetal demise, pleural effusions were noted. She was admitted to hospital for induction of labour and had a normal vaginal delivery of a stillborn baby weighing 7 lbs. 8 oz. During her hospital stay, she had an eclamptic seizure which was treated with magnesium sulfate and supportive care.

The stillbirth workup was performed but an autopsy was declined. Given that the mother declined amniocentesis, it was impossible to prove whether this baby had Trisomy 21. Stillborn blood sent for genetics were not received by the laboratory. Serology was negative. Kleihauer-Betke test was negative. Hemoglobin A1C was within normal range.

The MPHSC felt that there were no concerns with the management of this case. The stillbirth was certainly unfortunate given that it occurred two days after a clinic visit with induction of labour planned for two days later. It was felt that the hypertension was not severe to warrant immediate induction and the diabetes was under control. This lady did have a fetal assessment for gestational diabetes at 36 weeks gestation and the growth of the fetus was appropriate at that time. At 39 weeks when her borderline hypertension was noted, and given that an induction of labour was planned for only 4 days later, the MPHSC felt that a fetal assessment need not have been done urgently. After much discussion, it was agreed that this outcome, while unfortunate, was non-preventable and unavoidable.

II. C.8

This case was reviewed for a stillbirth.

A 33-year-old G2P0 had a smooth pregnancy until 34 weeks gestation when she was diagnosed with gestational hypertension. She was treated with Labetalol and the blood pressure was well controlled. At the time of her diagnosis, her pressures were 150/100 mmHg and with Labetalol, her blood pressure went into the normal range and recordings of blood pressures at home ranged from 120/60 to 130/80 mmHg. At the office, her blood pressure was noted on one occasion to be 140/90 mmHg but all other blood pressures were 130/80 mmHg. There was no proteinuria.

She had a fetal assessment a few days before her presentation with a stillbirth at 38 weeks gestation and the biophysical score and doppler studies were essentially negative. Her pre-eclampsia workup was also within normal range with normal liver function tests, normal uric acid, and no evidence of proteinuria. She presented at 38 weeks gestation with decreased fetal movements and fetal death was confirmed. She was induced. At birth there was evidence of placental abruption with a large clot behind the placenta and a very short cord. Kleihauer-Betke test was positive at 180 cc of fetal blood in maternal circulation.

The case was reviewed in detail by the MPHSC. It was felt that there was no error in management. Fetal death secondary to abruption in the context of mild gestational hypertension is unfortunate but uncommon and unpredictable. The case was classified as non-preventable and unavoidable.

II. C.9

This case was reviewed for a stillbirth.

A 23-year-old G2P0 had a smooth pregnancy with normal blood pressures throughout the pregnancy and no evidence of diabetes presented at 39 weeks gestation to the clinic. She was noted for the first time to have high blood pressure of 150/90 mmHg that subsequently settled on repeat to 140/83 mmHg. The patient reported no fetal movement but the fetal heart was recorded at 150 bpm. She was sent to the triage area for further monitoring of her blood pressure and to obtain a pre-eclampsia workup. She was seen in triage approximately 3 hours after her clinic visit but no fetal heart rate was detected at the time. With stillbirth confirmed, she was induced and delivered a baby weighing 2394 grams. The stillbirth workup was totally negative and an autopsy was done which showed no fetal abnormalities.

The MPHSC felt there was no error in management by the physician given that appropriate measures were undertaken when hypertension was diagnosed. This case was classified as non-preventable and unavoidable.

II. C.10

This case was reviewed for a stillbirth.

A 23-year-old G1 had a very smooth pregnancy until 41 weeks gestation. She presented to the triage area with early labour. Her cervix was not dilated and her contractions were not strong or frequent. A contraction stress test as well as the fetal heart rate tracing was perfectly normal with no evidence of decelerations and normal variability and accelerations. She was sent home but presented the next day in labour but no fetal heart rate could be detected.

At birth, there was a tight nuchal cord with meconium stained amniotic fluid. An autopsy was performed and was unremarkable. Maternal serology was negative. She had an elevated maternal alpha fetoprotein but had routine fetal assessments as per protocol that were normal throughout the pregnancy. There was no identified clinical risk factor that could be identified to prevent this outcome. The death was likely due to a cord accident. This case was classified as non-preventable and unavoidable.

II. C.11

This case was reviewed for a stillbirth.

A 33-year-old lady, G8P2, had a smooth pregnancy under the care of midwifery. She presented at term in spontaneous labour to the birthing centre and she was found to be 2 centimeters dilated, 50% effaced with a normal fetal heart rate auscultated by intermittent auscultation. She was in the latent phase of labour. She was sent home but returned two hours later, at which time she was 5-6 centimeters dilated and in the throes of active labour. Unfortunately, no fetal heart rate could be heard at that time and she was rushed to a tertiary centre where fetal demise was confirmed.

Upon delivery, there was a tight nuchal cord and the baby weighed 2960 grams. Of importance is that she underwent a fetal assessment two days prior and the baby was on the 20th percentile with a normal biophysical score and normal doppler studies. The stillbirth workup was essentially negative with a normal karyotype. The autopsy was non-contributory and the rest of the stillbirth workup was negative. The only finding was that of a possible placental cause in that there were subchorionic plaques and the pathologist questioned possible thrombotic vasculopathy.

The MPHSC felt that the standards of care were met by the health care workers. The mother was not in the active phase of labour when she was sent home. The death was likely contributed to a tight nuchal cord as well as possible placental dysfunction. This case was classified as non-preventable and unavoidable.

II. C.12

This case was reviewed for a stillbirth.

A 30-year-old primigravida had a smooth pregnancy but presented at 40 weeks gestation with decreased fetal movement. Fetal demise was confirmed. Of note is that her last prenatal visit was at 36 weeks gestation. Labour was induced with misoprostol but that failed. Oxytocin was not used to further promote induction. Instead she underwent an emergency caesarean section and the baby weighed 3470 grams.

The stillbirth workup was negative. Autopsy showed findings consistent with possible ischemic death. The baby was macerated. There were no anomalies. Maternal serology workup was negative. This stillbirth was classified as non-preventable and unavoidable.

The MPHSC questioned why an induction of labour was not escalated with the use of oxytocin. The patient could have been spared an emergency caesarean section for a fetal demise. Of note, this lady ended up with a repeat caesarean section in a subsequent pregnancy, which was complicated by significant infectious morbidity. The stillbirth remains unexplained, but was likely due to ischemic changes that may have occurred between 36 and 40 weeks gestation.

II. C.13

This case was reviewed for a stillbirth secondary to an abruptio. A 28-year-old G5P4 had no prenatal care and presented at 31 weeks gestation to the nursing station with antepartum hemorrhage. A stillbirth was confirmed and she was transferred to Winnipeg for further management and delivery. There was no autopsy done. The baby weighed 2086 grams at birth. There was clinical abruption. Pathology confirmed retroplacental clot.

The MPHSC debated whether prenatal care would have impacted on preventing an abruption. This lady's previous deliveries were all normal. Although, there may have been some identifiable risk factors that may have led to an abruptio in this pregnancy, there were no reported events of bleeding. Occurrence of an abruptio event remains in general unpredictable, even with risk factors. Given no history of bleeding in this index pregnancy, there would have been no indication to transfer this lady from a Northern Unit to the vicinity of a tertiary centre at an earlier date prior to term. After much discussion, the MPHSC decided to classify this case as non-preventable and unavoidable even though the patient did not seek prenatal care.

II. C.14

This case was reviewed for a stillbirth.

A 33-year-old G1 had a smooth pregnancy with care received in Winnipeg. Her place of residence was in rural Manitoba. At 41 weeks gestation, her cervix remained unfavorable for induction.

She underwent a fetal assessment which showed no abnormalities, normal doppler studies and normal fetal growth. She wished to be induced in her rural home town at a secondary centre within a couple of days.

At the time of her presentation to the rural hospital she claimed decreased fetal movement and intrauterine fetal demise was confirmed. Induction was initiated in the rural setting, but she developed intrapartum fever which was treated with triple antibiotics. She was given an epidural anesthetic following which her oxygen saturation dropped and she continued to be hypotensive. She was then transferred to a tertiary centre where induction was resumed. She delivered a stillborn male weighing 3711 grams.

E. coli was cultured from the amnion and chorion. The stillbirth workup otherwise was totally negative. The maternal hemoglobin A1C was normal and the lupus inhibitor and Kleihauer-Betke were negative. The mother was anemic. Antibiotics were continued for two weeks following the delivery. Of note, is that in the immediate postpartum period, she had shortness of breath. A spiral CT was done negating the presence of pulmonary embolism. It is very likely that she was over-infused with intravenous fluids. Her cardiac echogram was normal. She was given Lasix and did well. The baby was not dysmorphic. Genetics were consulted but not feel that any genetic workup was needed.

The MPHSC felt that there was no error in management and this case was classified as non-preventable and unavoidable. The stillbirth was likely secondary to intrauterine chorioamnionitis.

II. C.15

This case was reviewed for a stillbirth in a twin pregnancy.

A 33-year-old G1 lady was diagnosed in early pregnancy at 20 weeks gestation with monochorionic diamniotic twins. The sonographer at the time felt that Twin A was appropriate for size, but Twin B was two weeks behind at around 18 weeks gestation. There was a recommendation to have this twin pregnancy referred to fetal assessment for further monitoring of the twins as it was suspected there may be fetal-fetal transfusion from Twin B to Twin A. The mother was referred but the referral was for a 5-week fetal assessment at 25 weeks. Thankfully, at the time of the fetal assessment there was no evidence of TTS (i.e. fetal-fetal transfusion), but Twin B was selectively growth restricted with no connection to Twin A. Twin B deteriorated further to less than the 10th percentile for gestational age, while Twin A was at 40th percentile for gestational age. Twin B developed ventriculomegaly. Cord occlusion was offered to the patient for Twin B, but the patient declined in favour of expectant management. The patient received steroids and it was decided to have an elective caesarean section at around 32 weeks gestation. She was then booked for more frequent fetal assessments to assess the progress on Twin B. Incidentally, at 29 weeks gestation, there was absent end diastolic flow of Twin B but with normal middle cerebral arterial flow. At 29 weeks and 5 days, Twin B died.
Given that there was no connection with Twin A, it was opted to continue conservative management of Twin A. The pregnancy was followed to 39 weeks gestation, at which time an elective caesarean section was done without complication.

The stillbirth of Twin B was inadvertent and was non-preventable and unavoidable. An educational letter was sent to the family physician involved stressing the importance of immediate

referral of monochorionic twins to fetal assessment, particularly when there is a discrepancy in growth simply because of the possible scenario of twin-to-twin transfusion syndrome. Had it been that this discrepancy in growth between the two twins was secondary to TTTS, then this would have compromised both twins quite early in the pregnancy.

II. Non-Preventable and Unavoidable:
D. Perinatal Morbidity

II. D.1

This case was reviewed for a low 5-minute Apgar score.

A 31-year-old G3P1 lady was at 42 weeks gestation after adequate prenatal care. She had spontaneous labour, intermittent auscultation, and managed to get to full dilation within a short period of time and pushed for 13 minutes. Her delivery was vaginal but the baby was flat at birth with Apgar scores of 1 and 4 and 9 at 1, 5 and 15 minutes.

The MPHSC members questioned whether an EFM should have been used rather than intermittent auscultation given post-dates pregnancy. After much discussion and given that the pregnancy was uneventful, with no risk factors and given that the baby was adequate in size, intermittent auscultation was deemed appropriate. The MPHSC classified this case non-preventable and unavoidable.

II. D.2

This case was reviewed for fetal acidosis requiring admission to the NICU.

A 28-year-old primigravida lady at 40 weeks gestation presented to triage with irregular contractions and deep variables (150 bpm to 60 bpm). The cervix was 2-3 centimetres dilated. An emergency caesarean section was done under spinal anaesthetic.

The baby weighed 3040 grams with Apgars of 8 and 8 at 1 and 5 minutes. Umbilical cord artery pH was 7.00 with a lactate of 12.8. The baby needed routine resuscitation and had no major problems.

Of note is that the patient had been to triage some 12 hours earlier. She was observed for 4 hours and discharged some 8 hours before returning to triage. At the time of the initial discharge the patient was contracting every 5 minutes and the cervix was 3 centimetres and posterior but the fetal heart rate tracing pattern was normal. The decision was made to let the patient go home until more active labour ensued.

The MPHSC concluded that the standard of care was met with regards to discharging a patient home during the early stages of labour. The standard of care is to let women in early labour with no evidence of fetal compromise is expectant management with possible discharge home. This case was classified as non-preventable an unavoidable.

II. D.3

This case was reviewed for a low 5-minute Apgar score and intrapartum fetal asphyxia.

A G2P1 lady with a previous delivery 9 years earlier in another country was told then that she had diabetes after delivery. During this index pregnancy a 28-week 50-gram glucose test was normal. At 36 weeks, however, the fundal height was 44 centimeters. At 38 weeks, there was spontaneous onset of labour. The first stage of labour was quick. After 30 minutes in the second stage, a vacuum assisted delivery was done for an occiput-posterior vertex. There were 3 pulls over 6 minutes. Severe shoulder dystocia was encountered after delivery of the head.

Initial attempts were made to resolve the shoulder dystocia with McRoberts maneuver, Wood's screw maneuver, suprapubic pressure, and an attempt to deliver the posterior arm. After 4 minutes of failed attempts, another clinician was able to resolve the shoulder dystocia by applying posterior axillary traction.

The baby weighed 5,420 grams. Apgars were 0 at 1 minute and 4 at 5 minutes. Umbilical artery pH was 7.14. The baby needed positive pressure ventilations and cardiac compressions. Spontaneous respirations first occurred at 12 minutes. By 30 minutes of age, the baby was extubated to CPAP, and received prophylactic cooling. There were no clinical seizures and a follow-up MRI was normal.

On day 1 postpartum, a random maternal blood sugar measured 11.5 mmol/L. This is consistent with the notion of the second trimester blood sugar screening for gestational diabetes having a false negative rate of 5-10%.

The MPHSC felt that the physician followed acceptable national guidelines for screening for gestational diabetes and for management of the shoulder dystocia. This case was classified as non-preventable and unavoidable.

II. D.4

This case was reviewed for newborn respiratory distress requiring NICU admission.

The mother was a nullipara with a BMI of 37 and type 2 diabetes treated with metformin. During the pregnancy she was started on insulin. She also had gestational hypertension. Her GB streptococcus colonization screening was negative at 36 weeks. There was spontaneous vaginal vertex delivery at term. No maternal fever was detected intrapartum. The baby weighed 3380 grams and the Apgar score was 9 at 1 minute and 9 at 5 minutes with an umbilical artery pH of 7.17.

At 33 hours of age, the baby had respiratory distress with indrawing, nasal flaring, tachycardia, and a temperature of 37.9. Antibiotics were started promptly. A lumbar puncture showed white cells. At 41 hours of age, seizure activity was noted. Blood cultures and cerebral spinal fluid cultures grew Group B Strep Streptococcus.

This case represents a false negative Group B streptococcus colonization screen. The MPSHC could find no fault with management and classified this case as non-preventable and unavoidable.

III. Unknown/Unclassifiable:

III. E.1

A 33-year-old lady of unknown gravida or parity was at 34 weeks gestation when she was found unresponsive at home by her boyfriend. She was pronounced dead at the scene. This lady had a history of depression and anxiety and was being treated with citalopram. Past history includes previous suicide attempts, alcohol and substance abuse. She was HIV positive. Autopsy showed pulmonary congestion and anthracosis. She had a previous cholecystectomy. The toxicology showed therapeutic to high levels of oxycodone, citalopram, doxylamine, and zopiclone. There was also evidence of focal acute bronchopneumonia.

The MPHSC reviewed the case in an attempt to classify whether it was preventable; however, the cause of death remains uncertain. There may have been an attempt at suicide through oxycodone as a result of severe depression, but this remains unproven. The MPHSC categorized this case as unclassifiable as to preventability.

III. E.2

This case was reviewed for a neonatal death. A 29-year-old G2P1 whose previous pregnancy was complicated by repeated antepartum hemorrhages and a delivery at term of a 4 lbs. 12 oz. baby was now pregnant under the care of an obstetrician. Ultrasounds done in the early second trimester confirmed dates. Clinical suspicion of intrauterine growth restriction was confirmed by ultrasound showing the abdominal circumference of the fetus at the 4th percentile for gestational age. She was known to have GBS colonization. Two days prior to her index presentation she was seen by her obstetrician with a cervix at 3 centimeters dilation.

At 39 weeks gestation, she presented to the labour unit in very active labour at 7 cm dilation. The nurse was having trouble getting a fetal heart rate as the patient was moving about. The obstetrician arrived 20 minutes later and noted that the patient was fully dilated. This was followed shortly by the spontaneous delivery of a female infant that was flat and limp with Apgar scores of 1 and 0 at 1 and 5 minutes.

Resuscitation was commenced by the pediatrician that was summoned. The placenta showed signs of abruption but the cord appeared to be bloodless. The baby showed a slow heart beat at delivery. The pediatrician remained with the baby for nearly an hour after which, neonatal death was announced. The umbilical vein pH was 7.25 with a PCO2 of 43 mmHg and a PO2 of 41 mmHg. The base excess was -8 and the lactate was 4.7. STORCH screen was done, the results of which were negative. It was thought by the pediatrician and the obstetrician that this baby may have been affected by Group B streptococcal sepsis; however, cultures of the baby proved negative for GBS. The mother declined autopsy and the placenta was not sent for pathology.

The cause of this neonatal death remains unknown, although placental insufficiency may have been a factor, the Apgar scores do not correlate well with the umbilical venous pHs as documented. The MPHSC was unable to classify this case.

III. E.3

A 34-year-old G3P1 E1 Rh+ lady presented at 38 $^{5}/_{7}$ weeks gestation with decreased fetal movements. No fetal heart rate could be auscultated and an ultrasound confirmed fetal demise of at least three days prior to admission. She was 4 centimeters dilated subsequently delivered vaginally. Shoulder dystocia was experienced at the time of birth lasting about 20 minutes. The baby's weight was 3240 grams. The patient declined autopsy of the fetus.

The prenatal sheet of this lady was reviewed. This showed that she had a previous normal vaginal delivery at 39 weeks gestation weighing 3388 grams. There were no untoward clinical findings on the prenatal sheet. Maternal serum screening was not done. The 1 hour 50-gram glucose sugar challenge test was negative. Her HIV and hepatitis B testing were negative. There were no other tests performed as part of the workup for stillbirth. The placental pathology was not done. All other workup for viruses, bacteria, listeria and karyotyping was not performed.

The MPSHC could not classify this case given the incomplete workup. An educational letter was sent to the Chair of the standards committee where the stillbirth occurred stressing the standards requirement for a full stillbirth workup.

Statistical Summary

A total of 16,980 births occurred in Manitoba in 2014 with the MPHSC reviewing 390 cases. The following tables represent the cases reviewed by the MPHSC that occurred in 2013.

Causes of Stillbirth

Cause	Total
Antepartum Placental Insufficiency / Hypoxia-Acidosis +/- IUGR	9
Cord Accident	9
Abruptio	6
Congenital Anomalies	6
Premature Rupture of Membranes / Sepsis	4
Diabetes Mellitus	3
Twin-to-Twin Transfusion	3
Genetic Anomalies	3
Viral Infection (e.g. parvo virus)	1
Trauma	1
Cholestasis	1
Severe Hypertension Disorder (eclampsia)	1
Unknown	26

Source: MPHSC Database

Causes of Neonatal Mortality

Cause	Total
Extreme Prematurity Complications	16
Congenital Anomalies (without documented genetic anomaly)	12
Genetic Anomalies (with or without congenital anomalies)	4
Perinatal Hypoxia / Acidosis / Asphyxia / Abruptio / Cord Prolapse	4
Necrotizing Enterocolitis	3
Intraventricular Hemorrhage	3
Hypoxic Ischemic Encephalopathy	2
Prematurity with RDS, HMD, Respiratory Collapse / Pneumothorax	2
Pulmonary Hypoplasia / Oligohydramnios	2
Sudden Infant Death Syndrome	2
Prematurity with Sepsis / Septic Shock	1
Cardiomyopathy	1
Pulmonary Hypertension	1
Meconium Ileus with Perforation	1
Unexplained	1

Source: MPHSC Database

Cases of Neonatal Morbidity

The following table represents neonatal morbidity cases that were reviewed by the MPHSC that occurred in 2014.

Neonatal Morbidity	Total
Acidosis / Low 5 Minute Apgar Score	87
Encephalopathy / Seizures / IVH	13
Meconium Aspiration / Persistent Pulmonary Hypertension of Neonate / Pneumonia / Pneumothorax	23
Respiratory Distress Syndrome	12
Transient Tachypnea of the Newborn	12
Trauma / Cephalohematoma / Erb's Palsy	30
Abnormalities / Genetic Disorders	24
Hypoglycemia / Hyperglycemia / Hyperbilirubinemia / Hypercalcemia	6
ABO Incompatibility / Rh Disease / Hydrops / Fetal Maternal Hemorrhage	2
Prematurity (Other than RDS)	2
Sepsis	5
Dehydration	1
Bradycardia / Cardiac Arrhythmia	1
Substance Withdrawal	1
Other (includes IUGR, Prolonged NICU Stay)	5

Source: MPHSC Database

Cases of Maternal Morbidity

The following table represents categories of the maternal morbidity cases that were reviewed by the MPHSC that occurred in 2014.

Maternal Morbidity	Total
Peripartum Hysterectomy / Uterine Rupture	8
Hemorrhage – APH / PPH / Abruptio	4
Pulmonary Edema / Dyspnea / Intubation	3
Hypertension Related Morbidity	
Eclampsia	1
Severe Gestational Hypertension	1
Infectious Morbidity / Sepsis / Septic Shock	1
Thrombotic Morbidity	1
Embolism	1
Necrotizing Fasciitis	1
Influenza (H1N1)	1
Organ Injury at C1S (e.g. cystotomy)	1
Severe Anemia	1
Other	3

Source: MPHSC Database

Total Deliveries and Caesarean Sections in Manitoba

The following tables represent the number of total deliveries and caesarean sections in Manitoba by RHA of hospital for 2009 to 2014.

2009				
RHA	Total Deliveries	Total C/S	Primary C/S	Repeat C/S
Winnipeg	10,967	2,131 (19.4%)	1,410 (12.9%)	721 (6.6%)
Brandon	1,502	424	256	168
North Eastman	7	0	0	0
South Eastman	490	76	40	36
Interlake	204	19	8	11
Central	1,183	223	137	86
Assiniboine	69	7	4	3
Parkland	408	98	60	38
Nor-MAN	517	82	44	38
Burntwood	910	132	71	61
Manitoba	**16,257**	**3,192 (19.6%)**	**2,030 (12.5%)**	**1,162 (7.1%)**

Source: Discharge Abstract Database

2010				
RHA	Total Deliveries	Total C/S	Primary C/S	Repeat C/S
Winnipeg	10,692	2,260 (21.1%)	1,496 (14.0%)	764 (7.1%)
Brandon	1,440	413	218	195
North Eastman	4	0	0	0
South Eastman	502	82	47	35
Interlake	229	22	11	11
Central	1,269	258	155	103
Assiniboine	62	10	7	3
Parkland	358	98	50	48
Nor-MAN	499	79	48	31
Burntwood	870	120	75	45
Manitoba	**15,925**	**3,342 (21.0%)**	**2,107 (13.2%)**	**1,235 (7.8%)**

Source: Discharge Abstract Database

2011				
RHA	Total Deliveries	Total C/S	Primary C/S	Repeat C/S
Winnipeg	10,700	2,282 (21.3%)	1,536 (14.4%)	746 (7.0%)
Brandon	1,579	456	243	213
North Eastman	3	0	0	0
South Eastman	475	72	43	29
Interlake	228	27	19	8
Central	1,181	225	123	102
Assiniboine	88	19	10	9
Parkland	356	85	49	36
Nor-MAN	452	78	42	36
Burntwood	785	99	57	42
Manitoba	**15,847**	**3,343 (21.1%)**	**2,122 (13.4%)**	**1,221 (7.7%)**

Source: Discharge Abstract Database

2012				
RHA	Total Deliveries	Total C/S	Primary C/S	Repeat C/S
Winnipeg	10,990	2,344 (21.3%)	1,481 (13.4%)	863 (7.9%)
Brandon	1,645	515	291	224
North Eastman	9	0	0	0
South Eastman	481	71	40	31
Interlake	230	26	21	5
Central	1,296	265	160	105
Assiniboine	89	18	9	9
Parkland	305	87	9	9
Nor-MAN	480	79	52	27
Burntwood	804	118	74	44
Manitoba	**16,329**	**3,523 (21.6%)**	**2,180 (13.4%)**	**1,343 (8.2%)**

Source: Discharge Abstract Database

2013				
RHA	Total Deliveries	Total C/S	Primary C/S	Repeat C/S
Prairie Mountain Assiniboine Brandon Parkland	2,049	579	326	253
Interlake-Eastern Interlake North Eastman	258	40	31	9
Northern Burntwood NOR-MAN	1,305	234	134	100
Southern Central South Eastman	1,727	299	156	143
Winnipeg	11,167	2,416	1,390	1,026
Manitoba	**16,506**	**3,568** (21.6%)	**2,037** (12.3%)	**1,531** (9.3%)

Source: Discharge Abstract Database

2014				
RHA	Total Deliveries	Total C/S	Primary C/S	Repeat C/S
Prairie Mountain Assiniboine Brandon Parkland	2,095	645	337	308
Interlake-Eastern Interlake North Eastman	316	80	58	22
Northern Burntwood NOR-MAN	1,328	224	135	89
Southern Central South Eastman	1,819	334	118	146
Winnipeg	10,941	2,372	1,376	996
Manitoba	**16,499**	**3,655** (22.1%)	**2,094** (12.7%)	**1,561** (9.4%)

Source: Discharge Abstract Database

Appendix

_____HOSPITAL PERINATAL REVIEW DATA SHEET

Perinatal Mortality (≥ 500 grams):

____ stillbirth and check one box below:
- ❑ antenatal
- ❑ intrapartum
- ❑ unknown

____ neonatal death under 29 days of age
____ Age at death (in days; "0" if less than 24 hours)

Perinatal Morbidity (≥ 1000grams) check all that apply:
____ Five minutes Apgar score ≤ 5
____ Seizures
____ Meconium aspiration with low Apgars (≤7)
____ Significant birth trauma (specify) _____
____ Baby transfer to ICU (reason if not listed above)_____
except for the following:
- For observation when no observation unit is available
- TTN
- Congenital Anomalies (if certain only reason for admission)
- Hypoglycemia
- Psychosocial

____ Other (specify)_____

Maternal Mortality:
____ Direct Obstetric
____ Indirect Obstetric
____ Non-obstetric

Maternal Morbidity:
____ Uterine rupture
____ Caesarean or peripartum hysterectomy
____ Fistula involving the female genital tract
____ Admit to Intensive Care Unit (specify) _____
____ Thrombo-embolic
____ Eclampsia
____ Other (specify) _____

Mother's Name:_____

Mother's Hospital #:_____

Mother's Birth Date (dd/mm/yyyy):_____

Mother's Age (at time of birth):_____

Gravida: _____ **Para**: _____

BMI: _____

Mother's Residence:_____

Gestational Age (on admission to hospital):_____

Gestational Age (at birth):_____

Baby's Name:_____

Baby's Hospital #:_____

Sex of Baby: _____ Male _____ Female

Baby's Birth Date (dd/mm/yyyy):_____

Baby's Birth Weight (grams):_____

Placenta Weight (grams):_____

Hospital of Birth:_____

Transfer from: _____ **to**:_____

Antenatal Care: Number of visits (Circle appropriate number)
0. None
1. < 4
2. > 4
3. Unknown

Gestational Age at Initiation of Prenatal Visits: _____

Mode of delivery (Circle appropriate)
1. Spontaneous
2. Operative vaginal
3. Caesarean Section – 1°
4. Caesarean Section – Repeat
5. VBAC after a Trial of Labour
6. Caesarean section after a Trial of Labour
7. Breech delivery
8. Twin delivery
9. Induction: Mode: _____

Apgar score at One minute _____ Five minutes_____

Cord pH – Arterial _____ **Umbilical Vein** _____

Date of Death (dd/mm/yyyy) _____

Stillbirth Information

Timing of Stillbirth: _____ Antepartum
_____ Intrapartum

Congenital Anomalies (if any) _____

Karyotype Anomalies (if any) _____

Autopsy: _____ done _____ not done _____ refusal

Significant Findings:_____

_____

Placental Pathology: _____ done _____ not done

Significant Findings:_____

_____

Antenatal Testing (check all that apply)

	Done	Positive	Negative	Unknown
Syphilis				
Toxoplasmosis				
Cytomegalovirus				
Herpes				
Hepatitis				
Parvovirus B19				
B-Streptococus				
Listeria				

Maternal Factors (check all that apply):

- ❑ Diabetes
- ❑ Hypertension
- ❑ Nutrition
- ❑ Medication Exposure
- ❑ Trauma
- ❑ SLE/APLA
- ❑ Uterine Rupture
- ❑ Cholestasis of pregnancy
- ❑ Smoking
- ❑ Abruption
- ❑ Multiple Pregnancy:
  - ❑ Feto-Fetal TX
  - ❑ Severe IUGR
  - ❑ Preterm SROM
  - ❑ Antenatal death of one of the twins
- ❑ Fetal Anemia, Heart Failure, Hydrops: _____
  - ❑ Maternal Antibodies
  - ❑ Kleihauer-Betke Test Result: _____
- ❑ Asphyxia Related Death
- ❑ Cord Event: ❑ prolapse ❑ compression ❑ knot

Most probable cause of death:_____
_____/ or unknown

Preventability (Circle appropriate number):

0. non-preventable
1. preventable
2. theoretically preventable
3. unknown & therefore unclassifiable

If 1 or 2 (above), **Preventable at Level of**:

1. obstetric care
2. paediatric care
3. anaesthetic care
4. family/patient
5. combined

Causative Factors (Circle appropriate number):

0. unavoidable
1. physician error in judgment
2. physician error in technique
3. physician error in judgment & technique
4. in hospital error in management
5. family or patient error in judgment
6. intercurrent disease
9. error in management, not affecting outcome
10. other: _____
11. combined, more than 1 of above
13. error in documentation/communication
14. resource Issues

Action: ___ Referral to College of Physicians and Surgeons Central Standards Committee
___ Referral to College of Registered Nurses of Manitoba
___ Referral to College of Midwives of Manitoba
___ Referral to Chief Medical Examiner's Office
___ Referral to other _____
___ Letter of Advice
___ Discussion with Involved Parties
___ None

Response to Action:

Maternal and Perinatal Health Standards Committee

Committee Members (2014)

Dr. W. Hooper, Chair, Obstetrician & Gynecologist
Dr. T. Buchel, General Practice
Ms C. Nykiforuk, Midwife
Dr. D. Peabody, Paediatrician
Ms V. Steeves, Manitoba Health Representative
Dr. C. Schneider, Obstetrician & Gynecologist
Dr. C. Ruth, Neonatologist
Dr. L. Nause, General Practice

Administrative Staff (2014)

Dr. M. Helewa, Obstetrician & Gynecologist, Medical Consultant
Dr. T. Babick, Deputy Registrar, CPSM
Mr. J. Martin, Administrative Assistant, MPHSC, CPSM

Current Administrative Staff (2018)

Dr. M. Helewa, Obstetrician & Gynecologist, Medical Consultant
Dr. T. Babick, Deputy Registrar, CPSM
Mr. J. Martin, Administrative Assistant, Maternal and Child Programs, CPSM

This annual report was prepared and written by Dr. Michael Helewa, Medical Consultant for the MPHSC.