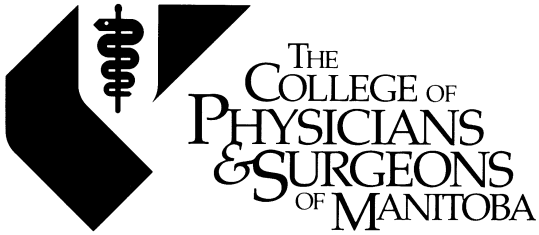
THE MATERNAL AND PERINATAL HEALTH STANDARDS COMMITTEE 2009 AND 2010 ANNUAL REPORT



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Acknowledgements

The Maternal and Perinatal Health Standards Committee (MPHSC) is pleased to present the 33rd and 34th combined Annual Reports for the calendar years 2009 and 2010.

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
- College of Midwives 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 a pleasure to have led the production of this annual report for the calendar years 2009 and 2010. I was appointed to serve as Medical Consultant of the MPHSC as of May 2012 to replace my predecessor, the ever able, Dr. Eric Stearns who served as the Medical Consultant from 2002 to 2012.

After a period of orientation primarily provided by Dr. Eric Stearns, Dr. William Pope, Registrar of The College of Physicians and Surgeons of Manitoba, Dr. Terry Babick, Deputy Registrar of The College of Physicians and Surgeons of Manitoba, and the administrative support of The College of Physicians and Surgeons of Manitoba, efforts were underway to produce this report. I thank Dr. Eric Stearns for pointing out the cases to be included with this report as these were reviewed prior to my tenure.

This report is organized in a slightly different format from reports of previous years to reflect the work of the MPHSC. The stated objectives and goals of the MPHSC 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.

As such, this report is primarily focused on case reviews from the calendar years 2009 and 2010, using these cases as a template to address the above goals and objectives. It is hoped that these cases will be of educational value to all health care professionals dealing with maternity and neonatal care.

The case summaries have been divided 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, theoretically preventable and avoidable, and a select number of cases that were non-preventable and unavoidable.

At the end of each case summary, and particularly for the cases that were judged to be preventable or theoretically preventable and avoidable, the action taken by the MPHSC and/or the local hospital standards committee is described.

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 areas may reduce future preventable or theoretically preventable mortalities and morbidities.

Definitions of terms used for the purpose of the report are included. I have deleted all other standard definitions of terms that were included in previous reports but are not pertinent to this report.

Reports of previous years traditionally included a section on statistics provided by Manitoba Health, Vital Statistics Canada, and other information resources. As collecting national or provincial maternity and neonatal statistics is not under the jurisdiction of the MPHSC, that section has been deleted as a whole from this report. However, particular statistics that may give perspective to the case summaries have been included. The interested reader of a vital statistics report is referred to check the Manitoba Health website at http://www.gov.mb.ca/health/.

We hope the contents and new format of the report will be of educational value to the readers. I would appreciate any feedback as MPHSC embarks on producing the next report for 2011, followed by 2012. You can send comments to Mr. Jason Martin at jmartin@cpsm.mb.ca.

Respectfully submitted,

Michael Helewa, MD, FRCSC
Medical Consultant,
Maternal and Perinatal Health Standards Committee

MPHSC Executive Summary

The total number of births in the province had shown a 2.0% increase compared to the years of 2007 and 2008. In 2009 there were 16,365 births and in 2010 there were 16,252 births. This is in an increase in nearly 250-350 births in the province compared to the years 2007 and 2008.

Perinatal Mortality rate, according to the Vital Statistics Agency of Manitoba Annual Report was 12.5 per 1000 births in 2009 and 12.7 per 1000 births in 2010. Statistics Canada reports a perinatal mortality rate in Manitoba of 6 per 1000 births. The two agencies use different definitions for calculating perinatal mortality. 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 3 maternal deaths in Manitoba, 2 in 2009 and 1 in 2010. All maternal deaths were Indirect Maternal Deaths. The two deaths in 2009 were attributed to the H1N1 flu outbreak with 1 of the deaths being compounded by an error in technique during management. The death in 2010 was attributed to poor patient compliance with anticoagulation therapy resulting in a fatal pulmonary embolism.

There were 85 cases of maternal morbidity in 2009 and 2010 that were reviewed by the MPHSC. We have included 8 cases in this report, 5 from 2009 and 3 from 2010. Of these, 3 cases were felt to have been theoretically preventable and avoidable and were the result of errors in judgement. In all 3 cases a change in the type of medical care delivered could have altered the outcomes.

In 2009 there were 139 stillbirths reported to MPHSC, while in 2010 there were 141 stillbirths reported. In addition there were 62 early and late neonatal deaths in 2009 and 86 early and late neonatal deaths in 2010 reported to the College. All these cases were reviewed by the medical consultant and many were reviewed by the MPHSC. Of those cases, 12 were judged to have been preventable or theoretically preventable and avoidable. In 4 cases, errors in judgement by physicians were contributory factors and changes in management could have altered outcomes. In 1 case, better coordination and communication between two different departments could have altered the outcome of neonatal death. In another case, suboptimal nursing resources at time of peak activity contributed to a fetal demise. In 6 cases, patient errors in compliance exemplified by lack of prenatal care contributed to the fetal demise.

In 2009 there were 244 cases of neonatal morbidities reported to the MPHSC and 177 cases reported in 2010. All these cases were reviewed by the medical consultant and many were reviewed by the MPHSC. Of those cases, 22 were judged to have been preventable or theoretically preventable and avoidable. In 12 cases, errors in judgement and in 3 cases errors in technique by physicians were contributory factors and changes in medical management could have altered outcomes. There were also 4 cases attributed to in hospital error in management. In all the above cases, educational letters and educational activities took place for the health care workers involved. In 1 case, suboptimal neonatal intensive care unit resources may have contributed to an observed perinatal morbidity. In 3 cases, compliance issues by patients may have contributed to observed perinatal morbidity.

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

- Human and physical resources may have been challenged at times of peak activity in 2009 and 2010, especially at tertiary centre's neonatal and obstetrical units. Such resource challenges have resulted in the necessity to transfer patients from one tertiary centre to another at times of ongoing medical crisis or may have resulted in delays in initiating interventions that were necessary. (Cases in example; I-C.5, I-D.20, II-C.8)

- Equipment failures and technical errors have contributed to mortality and morbidity. These issues have been addressed by the MPHSC and by the hospital critical incident reviews. (Cases in example; I-A.1, I-C.7)

- Errors or delay in interpretation of fetal monitoring strips or maternal/neonatal vital signs, errors in judgement and in decision making and errors in technique by health care workers of all disciplines have contributed to several preventable or theoretically preventable mortalities or morbidity cases. For some cases, this has caused delays in necessary interventions or may have resulted in inappropriate interventions or may have contributed to preventable trauma as a result of errors in technique. (Cases in example; I-B.1, I-B.2, I-C.1, I-C.3, I-C.6, I-D.1, II-D.16, I-D.18-20). In all cases, educational activities took place with the parties involved.

- System errors in communications between disciplines or between individuals working in a team have contributed to some preventable or theoretically preventable mortalities or morbidities. In all cases, guidelines on interdisciplinary communication were developed and escalation protocols introduced. These guidelines clearly stated the role and responsibilities and the expected channels of communication between the disciplines involved in caring for maternity or perinatal patients. (Cases in example; I-C.4, I-D.2, I-D.5, I-D.10, I-D.14, II-C.8)

- Unattended homebirths remained an issue in 2009 and 2010. The perils of such births without support is demonstrated in one of the cases (I-C.11). Barriers and facilitators to improve access to prenatal care, intrapartum and postpartum support for those who entertain unattended homebirths need to be addressed.

- Patients' non-compliance with diagnostic or therapeutic regimens was also an issue in 2009 and 2010. Improvements to health care workers-patient communications and exploring barriers that may affect patient's compliance with proposed regimens of therapy need to be addressed. (Cases in example; I-A.2, I-C.2, I-C.8-10, I-D.22)

- Missing or inability to retrieve patients' records, especially those pertaining to fetal monitoring strips was a problem in 2009 and 2010. This has resulted in some of the cases remaining unclassifiable by the MPHSC. Fetal heart rate tracing monitor strips archival systems and the introduction of electronic medical record may protect against loss or non-retrieval of documents especially needed for audit processes and medical legal activities. (Cases in example; III-C.1-4)

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.
- Recommend 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 for the years 2009 and 2010. We have included all cases where outcomes are deemed preventable and avoidable and select cases where outcomes were deemed to be non-preventable and unavoidable.

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

I-A.1

A 24 year old G2P1 lady at 39 weeks gestation presented to the Emergency Room with productive cough. She was assessed in the Emergency Department and was sent home with azithromycin with oxygen saturation of 87%. No chest x-ray was done. This lady came back two days later to the obstetrical triage unit in labour, but with worsening cough. An x-ray done at the time showed bilateral left lower lobe infiltrates suggestive of pneumonia. She was then treated with Tamiflu and antibiotics. She was deemed to be in hypoxemic respiratory failure and hence the Intensive Care Unit was consulted. She ruptured her membranes and thick meconium was noted.

The baby was in the breech presentation and she went for an emergent caesarean section. The baby, weighing 2424 grams, was born acidotic with an arterial cord pH of 6.27 weighing 2424 grams. The baby had Apgar scores of 5 and 9. The baby was intubated, ventilated, but was hypotensive. Following admission to the NICU the baby was noted to have seizures at 24 hours of age; an EEG and brain MRI were consistent with global ischemia. The baby was discharged at three weeks of age with poor prognosis.

As for the mother, following delivery she was in the Intensive Care Unit during which, unfortunately, a feeding tube was inserted in her trachea and tube feeds were commenced, in essence resulting in aspiration pneumonia and which caused eventual maternal septic shock and cardiac arrest. The primary pneumonia was diagnosed as being an H1N1 influenza.

The case was classified as theoretically preventable and avoidable with errors in management at the level of the Emergency Department at her initial assessment, errors in technique at the Intensive Care Unit with the placement of the feeding tube into her trachea. There were no concerns with the obstetrical or neonatal care provided.

This case was further referred for review by the Standards Committee of the Emergency Room and Intensive Care Unit at the hospital involved and letters of education have been sent from the MPHSC to the parties involved.

I-A.2

A 36 year old lady, G2P1, presented to an outpatient department with irregular menses and nausea, where she was given Diclectin. Further assessment showed her to be pregnant. This lady has

been known, since age 16, to have an antithrombin III deficiency and has been recommended in the past to use heparin and coumadin; however, there had been compliance issues with these medications. At the time of her admission with nausea and proven pregnancy, it was evident that she was prescribed Fragmin but she did not proceed to have the prescription filled and there was no evidence that she went back to the outpatient department to receive her injections. It is doubtful that she herself administered the Fragmin.

Four days after the initial visit, she had chest pain and shortness of breath. Twenty minutes after being admitted with those symptoms she became unresponsive with grunting respirations, and within five minutes CPR was initiated, but was unsuccessful.

This patient died of pulmonary embolism in early pregnancy. It appeared that the medical care given to this patient prior to her death was appropriate and her death is likely to have been caused by her poor compliance with the recommended anticoagulation medication given for her antithrombin III deficiency problem. This case was classified as theoretically preventable with patient error in judgement.

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

I-B.1

This case was reviewed for uterine dehiscence. A 31 year old lady, G2P1 was scheduled for an elective repeat caesarean section to occur at 40 weeks. She had a previous caesarean section and myomectomy abroad two years earlier. She went into spontaneous labour just prior to her scheduled elective repeat caesarean section. She was delivered six hours after being admitted to the labour floor and at the time of delivery uterine dehiscence was noted intraoperatively.

The baby had Apgar scores of 6 and 9 with an umbilical artery cord pH of 7.00 with Hypercarbia. Fortunately the baby did well but there was potential of a very poor outcome for this child given the uterine dehiscence. Given the past history of a myomectomy it was felt that this lady's caesarean section should have been scheduled to be done perhaps 4 weeks earlier.

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-B.2

This is a case of postpartum re-admission with pre-eclampsia. A 19 year old G1P1 was noted in her 3rd trimester to have gestational hypertension with systolic and diastolic blood pressure that exceeded 160/106 mm Hg. She was treated with labetalol but her pre-eclampsia blood workup was negative. She was induced at 38 weeks gestation and delivered through a normal vaginal delivery of a live baby with Apgars of 6 and 9, weighing 2686 grams.

This lady's blood pressure worsened postpartum and she needed higher doses of labetalol. On the third day of her postpartum stay she was discharged home and her blood pressure was taken once the morning of her discharge and was recorded at 140/88 mm Hg. She did not leave until 2000 hours that evening with no documentation of her blood pressure throughout the day. She was readmitted 24 hours later with severe headache and blood pressures of 190/118 mm Hg. She was immediately readmitted. Both Adalat and Hydralazine were added to her labetalol and her blood pressure was finally brought under control to levels of 140/90 mm Hg.

There were concerns regarding the poor documentation of this lady's blood pressure on the day of her discharge. There were concerns that her postpartum blood pressure was not aggressively treated. This case was classified as theoretically preventable at the level of obstetrical care with in hospital error in management as well as error in documentation and communication. This lady would have been at risk for eclampsia or a CVA event in the postpartum period. An educational letter was sent to the team manager of the postpartum ward pertaining to the importance of proper documentation and appropriate monitoring of blood pressure in the postpartum period particularly in patients with hypertensive disorders of pregnancy.

I-B.3

This case was reviewed because of inappropriate performance of a caesarean section. A 26 year old G1P0 lady was admitted at 41 weeks gestation for induction of labour. She was given one dose of Cervidil prostaglandin insert. She was assessed 8 hours later where no change in her cervical status was noted. The patient was advised to have a caesarean section without an appropriate attempt at induction of labour. Further, the caesarean section was done two hours after the patient had a full meal. The baby weighed 3735 grams.

It was felt that the performance of a caesarean section without putting the patient through proper labour and in the absence of valid medical indication was inappropriate. The case was classified as theoretically preventable with physician error in judgement. An educational letter was sent to the physician involved.

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

I-C.1

A 31 year old G2P1 presented at 29 weeks gestation with vaginal bleeding, which, on speculum examination, was deemed secondary to a friable cervix. A non-stress test was performed showing normal heart rate with normal variability, but absence of accelerations. She was discharged from the hospital but returned a few hours later with increased bleeding and contractions; however, no fetal heart rate was demonstrated at that assessment. She went on to deliver a stillbirth, the autopsy of which demonstrated severe chorioamnionitis of the placenta and the membranes and the placental cultures were positive for peptoniphilus asaccharolyticus.

The committee was concerned that the patient was sent home at her first assessment without confirming a reactive non-stress test. As such, 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-C.2

This is a 22 year old G2P1 lady who presented at 33 weeks gestation with a stillbirth. She did not have prenatal care until 31 weeks gestation at which time a fetal assessment was performed and showed increased umbilical artery resistance Doppler with elevated S/D ratio. She was given an appointment for a repeat fetal assessment in one week, at which time she presented with cramping and ruptured membranes and was sent immediately to the labour floor where a macerated stillbirth was delivered precipitously. The autopsy showed a macerated fetus weighing 1400 grams and her placental pathology was non-contributory. She had a delayed postpartum hemorrhage two weeks after delivery, which was quite massive and required uterine artery embolization.

It was felt that the patient's reluctance to seek medical care was the contributory factor to the adverse outcome of this case. The care provided to the patient when she first attended at 31 weeks gestation was deemed appropriate. Hence this case was classified as theoretically preventable with patient error in judgement.

I-C.3

This was a 26 year old G1P0 lady with a known twin pregnancy. She presented at 25 weeks gestation with bloody discharge and mucus. Both fetal heart rates were heard and an ultrasound was performed showing normal healthy twins; however, no pelvic examination or a cervical length assessment were performed. She was discharged home and returned the following day with pelvic pressure and pain and in early labour. Given that she was in a rural setting she was transferred to a tertiary centre, but delivered on route 15 minutes prior to arrival at the tertiary centre. Both twins died neonatally.

The committee was concerned that the cervical assessment, either by pelvic examination or by ultrasound, was not done. This case was classified as theoretically preventable with physician error in judgement and management. An educational letter was sent.

I-C.4

This case was reviewed because of neonatal death. A 17 year old lady, G1P0 presented to the obstetrical triage at 39 weeks gestation complaining of shortness of breath. She was not in labour at the time. A fetal heart rate tracing was satisfactory. Because her major problem was that of shortness of breath she was sent to the Emergency Department for investigations where she spent 12 hours, requiring supplemental oxygen. A CT scan of her chest questioned a pulmonary embolism and so she was started on heparin. Unfortunately, over the 12 hours she spent in the Emergency Room, the fetus was not monitored. After being stabilized, she was sent back to the labour floor where upon placement of the fetal heart monitor, the fetal heart rate pattern was deemed ominous with spontaneous decelerations and no variability. An emergency caesarean section was called. Unfortunately, the caesarean section could not be done in an expedited manner given that the patient was already on full heparin and her oxygenation was suboptimal. The baby was eventually delivered with an umbilical artery pH of 6.93. Baby was resuscitated but eventually died neonatally.

This case was deemed theoretically preventable at the level of obstetrical care and emergency care. The concerns pertain to the fact that in the Emergency Room this patient was not put on a fetal heart rate monitor. This case demonstrated a disconnect between the Labour Floor and the Emergency Department with absence of clear roles for the Labour Floor and the Emergency Department in cases where pregnant women present with medical illnesses. Communication between the two departments was an issue as well. There were concerns regarding documentation pertaining to the reasons of not monitoring the fetus in the Emergency Room. One could speculate that if the fetus was monitored and found in distress, no intervention could take place given the maternal condition of respiratory stridor.

In response to the proceedings of this case, a conjoined document was released by the Departments of Obstetrics and Gynecology and Emergency Department clearly indicating conditions under which patients should be evaluated in the Emergency Department versus the Obstetrical Triage area when pregnant women present with severe medical illnesses. The importance of fetal monitoring while pregnant women are attended to in the Emergency Room was stressed. The document also specified the role of the obstetrical service in assessing fetal status and ensuring appropriate communications and team work with the Emergency Department. This neonatal mortality was felt to have been theoretically preventable and avoidable.

I-C.5

This was a 25 year old G1P0 lady with a normal pregnancy who presented at 39 weeks gestation with decreased and absent fetal movements of two days duration. A non-stress test was done showing normal fetal heart rate but absence of variability with no accelerations and no decelerations. Two hours after her admission to triage, the attending physician requested that the patient be transferred to the labour floor for an artificial rupture of membranes; however, there was a delay in this transfer during which the fetal heart rate tracing continued to show non-reactivity. She was finally transferred to the labour floor more than 4 hours after presenting to triage.

On the labour floor an artificial rupture of membranes was performed revealing thick meconium and an acute terminal bradycardia. She was immediately taken for a crash caesarean section and delivered 13 minutes later of a stillbirth weighing 3429 grams.

Unfortunately, the delay of her transfer to the labour floor was deemed secondary to lack of nursing resources at that time, namely an inability of the nursing staff to provided 1-to-1 care on the labour floor. Also of concern was that the reasons for the delay were not properly documented in the patient's chart. This case, as such, was classified as theoretically preventable due to in hospital obstetrical care secondary to nursing resource problems.

As a result of this case, the administration of the department attended to the resource issues. The faculty were also advised regarding the importance of documenting reasons for any future delays, especially when resource issues are playing a factor. This was also discussed at the physician council meeting of the department involved.

I-C.6

This case was reviewed for an intrapartum death. A 25 year old G1P0 lady presented at term in labour. A few hours after her admission, she was noted to have an abnormal fetal heart rate tracing with variable decelerations at full dilatation. During the pushing phase the decelerations became more ominous, deeper and wider and more prolonged. The patient was laboring in the low-risk area of the maternity unit and hence was transferred to the Labour Floor for a possible caesarean section. After more than 1 hour of an ominously looking abnormal fetal heart rate tracing the caesarean was performed 53 minutes later. The baby had Apgar scores of 0 and 0 at 1 and 5 minutes, with an umbilical artery pH of 6.7 and a base deficit of 16.6. Neonatal resuscitation was initiated but the baby could not be revived. A nuchal cord was wrapped around the baby's neck twice.

On review of the fetal heart rate tracing, the committee felt that there was an unacceptable delay in expediting the delivery of this patient given the severe fetal heart rate decelerations, and hence this case was classified as theoretically preventable at the level of obstetrical care with physician error in judgement. An educational letter was subsequently sent to the physician involved.

I-C.7

This case was reviewed because of neonatal death. A 33 year old lady, G3P1, presented at 26 weeks gestation with spontaneous rupture of membranes. She was noted to be 5 centimeters dilated and passing clots. The baby was a transverse lie. An emergency classical caesarean section was performed. The baby was 940 grams with an umbilical cord pH of 7.13 and Apgar scores of 3, 6 and 7 at 1, 5 and 10 minutes. In the Intensive Care Nursery the baby required blood transfusion; however, there was an equipment failure during the transfusion and the baby was inadvertently transfused 4x the required volume, resulting in neonatal polycythemia. An exchange transfusion was done to correct this; however, the baby developed DIC and had a Grade 4 intraventricular hemorrhage. At that time neonatal care was stopped.

This case was classified as theoretically preventable at the level of pediatric care due to equipment malfunction. The Department of Neonatology was contacted and a Critical Incident Review was called for, and as a result, transfusion equipment at the hospital involved was changed and corrective action was taken to prevent such events in the future.

I-C.8

This case was reviewed for a stillbirth. A 16 year old G1P0 with Type II diabetes was on insulin during her pregnancy. She was treated prior to her pregnancy with oral hypoglycemics. Her diabetic control was not optimal. She was seen in the fetal assessment unit as well as by endocrinology, but there were issues with compliance with her insulin intake.

At 32 weeks gestation she was admitted to hospital in an attempt to improve her diabetic control. Once the blood sugars were under reasonable control she was discharged home; however, in the home environment she became non-compliant again and at 36 weeks gestation no fetal heart rate could be heard and fetal death was confirmed. Labour was induced. Her glycosylated hemoglobin was 7.9%. The fetal death was felt to have been secondary to diabetes. This case was classified as theoretically preventable with patient error in judgement.

I-C.9

This case was reviewed because of a neonatal death secondary to placental abruption. A 29 year old G4P2 lady presented to hospital at 37 weeks gestation with vaginal bleeding. She refused delivery and left the hospital against medical advice. She returned several hours later with increasing bleeding. On fetal monitoring, fetal heart decelerations were noted and an emergency caesarean section was undertaken. The baby had Apgar scores of 1, 3 and 5 at 1, 5 and 10 minutes. A placental abruption was noted. The arterial cord pH was 7.04. The baby was transferred to a tertiary centre on the first day of life. Seizure activity was noted at that time. An MRI showed severe hypoxic ischemic encephalopathy and an EEG confirmed seizure activity. The neonatal course was further complicated by neonatal thrombocytopenia and renal shut down followed by multi-organ failure. Life support was withdrawn on day 8.

This case was classified as theoretically preventable with patient error in judgement in refusing the induction of labour. Had an induction of labour been undertaken after her first admission to hospital with pelvic bleeding, the fetal compromise may have been diagnosed early, and the baby may have had a better outcome.

I-C.10

This case was reviewed for a stillbirth. This 26 year old G5P4 lady with known Type II diabetes was poorly compliant with prenatal visits and with her insulin requirements. At 32 weeks gestation a fetal assessment was done showing fetal demise. Labour was induced and a stillborn weighing 1521 grams was delivered at 33 weeks gestation.

Pathology was non-contributory and there was no autopsy done. At the time of her admission to hospital for induction, her serum blood sugar was 20 mmol per litre. It was felt that this baby experienced a diabetic demise. The case was classified as theoretically preventable at the level of the patient with patient error in judgement.

I-C.11

This case was reviewed because of neonatal death. This 26 year old multigravida lady developed spontaneous premature labour at 29 weeks gestation but did not go to hospital, aiming for a home birth. During labour she developed spontaneous rupture of membranes. The baby was delivered precipitously by the father. The baby was initially breathing; however, within the hour it was noted that the baby's breathing was very labored. The father then called 911, and the baby was taken to the Emergency Room within 13 minutes of the call.

In emergency the baby was not breathing, there was no cardiac function and resuscitation efforts were attempted but failed. An autopsy was requested on the baby. This lady had received no prenatal care. It was felt that cultural and religious barriers may have played a role in her not seeking prenatal care. This case was felt to have been preventable with family/patient error in judgement.

I-C.12

This case was reviewed for a stillbirth. A 26 year old G5P4, non-compliant with prenatal care and known to have a substance abuse problem, including abuse of alcohol and gasoline was at 37 weeks gestation when she presented with rupture of membranes of 7 hours duration. On assessment the fetus was in a transverse lie with a shoulder and hand presenting with no fetal heart rate detected. The patient was subsequently taken to the operating room where a vertical lower segment caesarean section was carried out. The baby was confirmed to have been a stillbirth weighing 2821 grams with Apgar scores of 0 and 0. This case was classified as theoretically preventable with patient error in judgement.

I-C.13

This case was reviewed for neonatal death. A 26 year old lady planned to delivery her baby at home. She had spontaneous rupture of membranes at around 7 months of pregnancy. The patient did not have any prenatal care nor any physician or midwife involved in her care.

At birth the baby was noted by the father to be breathing; however, the baby stopped breathing after a while and 911 was called. Resuscitation efforts by the emergency medical services were not successful and the baby was rushed to hospital. In hospital further attempt at resuscitation failed to revive the infant. The placenta was buried under a tree. Autopsy of the baby showed a male infant with size consistent with 29 weeks gestation. No congenital anomalies were noted. There was cephalhematoma and small left subdural hemorrhage. The placenta was decomposed with no obvious pathologic changes. This case was classified as theoretically preventable and avoidable with patient error in judgement.

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

I-D.1

This case was reviewed for birth asphyxia. A 31 year old nullipara at 42 weeks gestation presented in active labour. Her labour was slow and needed augmentation with oxytocin. A maternal fever ensued during labour and antibiotics were given. Despite oxytocin her labour remained quite slow, requiring 3.5 hours to change from 9 centimeters to full dilatation. During the late first stage of labour the fetal heart rate tracing became abnormal. Fetal scalp sampling for scalp pH was entertained but was abandoned given that she was nearly fully dilated. Her second stage was 54 minutes long; however, was complicated by uterine hyperstimulation, and the fetal heart rate tracing became more ominous.

She delivered spontaneously of a 3539 gram baby with shoulder dystocia. Apgar scores were 1, 6 and 7 at 1, 5 and 10 minutes. The umbilical artery pH was 7.0 with a base deficit of 15.5. In the resuscitation room the newborn demonstrated seizure activity. The baby was managed with hypothermia therapy and developed a Grade 2 encephalopathy, but an MRI showed no evidence of hypoxic ischemic encephalopathy.

The concerns of this case riveted around management of her abnormal fetal heart rate tracing in late first stage and in the second stage of labour. It should have been documented that the fetus was not acidotic at that time by obtaining a scalp pH. Equally, hyperstimulation management in the second stage was also suboptimal. The committee felt that this case was preventable at the level of obstetrical care with physician error in judgement and management. An education letter was sent to the physician involved.

I-D.2

This case was reviewed because of low Apgar scores. A 36 year old G5P4 lady who was Type I diabetic and on insulin presented at 29 weeks gestation with diabetic ketoacidosis. She was treated with intravenous fluids and insulin intravenously. On the 4th day of her admission, she had some leakage of pelvic fluid. Uterine activity was noted. Intermittent fetal heart monitoring showed recurrent variable decelerations and as such she was transferred to the Labour Floor where fetal tachycardia was documented. An artificial rupture of membranes was done when she was 4 centimeters dilated; however, this was followed by a 3 minute bradycardia and the patient was immediately taken to the operating room for an emergency caesarean section.

The obstetrician requested that the patient be given a general anaesthetic; however, this patient had pseudocholinesterase deficiency and the anaesthesiologist decided for a spinal anaesthetic. Unfortunately the spinal anaesthetic took more than 35 minutes to take effect, during which the fetal heart rate remained ominous. The baby weighed 2315 grams, with Apgar scores of 3 and 5 and an umbilical artery pH of 6.71 with a base deficit of 18.7. The baby was intubated and given dopamine and glucose to combat hypoglycemia. The baby suffered seizures on the first day of life and the EEG proved diffusely abnormal, but the MRI was described as “normal”.

The committee was concerned with the delay in performing the caesarean section because of a prolonged spinal anaesthetic procedure in the context of an ominous fetal heart rate tracing. Despite her pseudocholinesterase deficiency this patient could have received a general anaesthetic to expedite the delivery. This case was felt to have been theoretically preventable with physician error in judgement at the level of combined obstetrics and anesthesia. Educational letters were sent to the parties involved.

I-D.3

This case was reviewed for low 5 minute Apgar scores. A 34 year old primigravida who developed pre-eclampsia in the 3rd trimester presented at 36 weeks gestation with spontaneous rupture of membranes and contractions. Fetal heart rate decelerations were noted with absent variability at full dilatation. She delivered spontaneously after a second stage of labour. Nuchal cord was noted to be tight around the baby's neck. The baby weighed 3299 grams with umbilical artery pH of 6.99 and a base deficit of 9.4. This baby was resuscitated with positive pressure ventilation and was kept in the nursery but did not develop any encephalopathy nor was there evidence of asphyxia.

The committee felt that the delivery should have been expedited 20-30 minutes earlier and that this case was theoretically preventable with physician error in judgement. An educational letter was sent to the physician involved.

I-D.4

This case was reviewed for neonatal seizures. A 29 year old G1P0 lady at 41 weeks gestation was planned to deliver in a rural setting. Maternal weight was 280 pounds. Her labour was complicated by failure to progress and a fetal heart rate that was abnormal and non-reassuring. She was hence transferred to a tertiary centre where bradycardia occurred and she was rushed for an urgent caesarean section. The baby was born through thick meconium with Apgar scores of 1, 3, and 4 at 1, 5 and 10 minutes. The umbilical artery pH was 6.7. The baby stayed in the NICU for three weeks and suffered difficult perinatal asphyxia with multi-organ failure; however, the baby did recover.

The committee was concerned that this patient did not have her caesarean delivery where she was delivering in the rural setting, and whether, given her body habitus, it would have been more appropriate for this patient to have been planned to deliver in a tertiary setting in the first place. The committee felt that this case was theoretically preventable at the level of obstetrics with physician error in judgement. An educational letter was sent.

I-D.5

This case was reviewed for neonatal seizures. A 22 year old G1P0 lady presented in spontaneous labour at 41 weeks gestation. She had a normal pregnancy. Labour was slow so she was augmented with oxytocin. Variable decelerations were noted in the second stage. The position of the fetal head was occiput posterior. She developed fever and was started on antibiotics. Two hours later, given the variable decelerations, it was decided to take this patient for a double setup delivery. In the case room an attempt at forceps failed to deliver the baby, so a caesarean section was done.

The baby had Apgar scores of 2 and 4 with an umbilical artery pH of 7.02, weighing 3897 grams. The baby was resuscitated, intubated with positive pressure ventilation and was taken to the observation unit. The baby was extubated and was discharged from the NICU. At 14 hours of age, the parents reported that the baby had jerky movements. The baby was assessed by nursing, but the nurse felt that the baby was doing well.

At 20 hours of age, right arm twitching was witnessed and the NICU was called. The baby was found to be hypoxemic with an oxygen saturation of 44% and was admitted to NICU for a full septic work up and treated with phenobarbital. The baby's NICU stay was complicated by further seizures and apneic spells. An MRI documented global ischemia of the central nervous system.

The committee felt that the obstetrical management of this case was appropriate, but the parents' concerns that their baby was not behaving normally should have been more appropriately assessed by the hospital staff and an earlier intervention by the pediatric service, including close observation should have been undertaken. This case was classified as theoretically preventable at the level of pediatric care with in hospital error in management. This case resulted in a Critical Incident Review at the hospital involved.

I-D.6

This case was reviewed for NICU admission. An 18 year old primigravida presented with a one day history of flu like symptoms at 41 weeks gestation and spontaneous rupture of membranes. Thick meconium was noted. She developed maternal fever in the first stage of labour and developed fetal tachycardia and deep variable decelerations throughout late in the first stage of labour and in the second stage of labour. Her second stage of labour was 25 minutes. She delivered spontaneously of a 4117 gram baby with Apgars of 1 and 6. Unfortunately umbilical artery pHs were not obtained at birth, but at 15 minutes of age the arterial pH was 7.19 with a base deficit of 15.7. The baby needed 18 hours of intubation. The mother was subsequently diagnosed with H1N1 flu virus infection.

The committee felt that the delivery should have been expedited sooner; i.e. late in the first stage or very early in the second stage of labour, given the abnormal fetal heart rate tracing. 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 attending involved.

I-D.7

This case was reviewed because of low Apgar scores and admission to NICU. A 32 year old primigravida at 41 weeks gestation presented with prolonged premature rupture of membranes. She was induced and had a very prolonged second stage of labour of more than 5 hours together with maternal fever. The fetal heart rate tracing was abnormal for most of the second stage of labour. A vacuum delivery was attempted and was successful in delivery of a live baby. Apgar scores of 2 and 3 at 1 and 5 minutes weighing 2797 grams with an artery cord pH of 7.03 and a base deficit of 12.9. The baby was intubated for 16 days and developed meconium aspiration and PPHN. MRI showed periventricular cysts of uncertain significance.

The committee reviewed the fetal heart rate tracing and felt that delivery should have been expedited been more than 1 hour earlier. The case was classified as theoretically preventable at the level of obstetrical care with physician error in judgement. An educational letter was sent to the obstetrician involved.

I-D.8

This case was reviewed for low Apgar scores and admission to NICU. A 26 year old lady primigravida at 40 weeks gestation presented with spontaneous premature rupture of membranes. In the triage area she was noted to be hypertensive with blood pressures of 145/108 mm Hg, but was asymptomatic. She was treated with labetalol and induction of labour was initiated. A few hours into the first stage of labour, a fetal heart rate tracing started to show late decelerations with a loss of variability. These were interpreted repeatedly by the attending physician the resident as being of variable decelerations. On one occasion there was significant bradycardia for which the patient was transferred to the case room; however, that bradycardia resolved and the labour was allowed to continue. The late decelerations persisted but continued to be interpreted as variable decelerations. At 6 hours of labour, still in the first stage, it was felt that the cervix was failing to dilate, and given the atypical fetal heart rate tracing, a caesarean section was done.

The baby had Apgar scores of 1, 4 and 5 at 1, 5 and 10 minutes with an umbilical artery pH of 6.78. The baby suffered severe hypoxic ischemic encephalopathy and underwent cooling therapy. The committee felt that the fetal heart rate tracing was misinterpreted and that the assessment of the fetal status through the scalp sampling or expediting delivery would have been more appropriate. The case was classified as theoretically preventable at the level of obstetrics with physician error in judgement. An educational letter was sent to the physician involved.

I-D.9

This case was reviewed for admission to NICU and neonatal seizures. A 36 year old G2P1 lady presented at 39 weeks gestation in spontaneous labour. She had had a previous caesarean section for failing to progress. At 2 centimeters dilatation the membranes ruptured, revealing thick meconium. A scalp clip was applied for monitoring of the fetal heart status. At full dilatation she complained of severe pain of her pubic area especially as she began pushing. The fetal heart rate tracing was more ominous

with loss of variability and decelerations. She was immediately transferred to the case room for a double set up forceps delivery.

In the case room a scalp pH was done showing a pH of 6.9. The forceps delivery was carried out successfully and she delivered a live baby weighing 3800 grams with Apgars of 1 and 2. The umbilical artery pH was 6.65. The baby was resuscitated and immediately ventilated and admitted to the NICU. Inspection of the lower uterine segment after delivery of the baby indicated that the scar was intact.

On further review of the fetal heart rate tracing, it was evident that the recurrent decelerations, some of which were quite prolonged, associated with reduced variability and slow recovery were ominous enough that expedited delivery was necessary. As such, 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.10

This case was reviewed for low 5 minute Apgar scores and neonatal seizures. A 25 year old G1P0 presented at 40 weeks gestation in spontaneous labour and spontaneous rupture of membranes. Her cervix was assessed to be a fingertip and her blood pressure was noted to be elevated at 160/100 mm Hg. Pre-eclampsia blood work was negative. The fetal heart rate tracing obtained in the triage was non-reassuring and it was decided to have her undergo an urgent caesarean section.

The baby was born with Apgars of 0 and 1 at 1 and 5 minutes with an umbilical artery pH 6.7. The baby suffered HIE and multi-organ dysfunction. Further assessment showed that fetal maternal hemorrhage of about 150 cc had occurred prior to birth. The newborn hemoglobin was only 130 grams/litre. There were concerns with regards to delay in her transfer to the labour floor given an initial abnormal blood pressure and an atypical fetal heart rate tracing that had resulted in the emergency caesarean section.

Despite the non-reassuring fetal heart rate tracing, this lady was kept in the triage for more than 1 ½ hours prior to transfer to the Labour Floor. Further, the electronic fetal heart rate monitoring was not initiated until 45 minutes after her admission, and after detecting elevated blood pressures. It is likely that this baby was already acidotic when the mother presented herself to the hospital; however, a more expedited assessment and a more timely emergency caesarean section may have resulted in a different outcome. This case was classified as theoretically preventable at the level of obstetrical care with in hospital error in management. The obstetrical program team manager was informed of these concerns, which were shared with the staff at the institution involved.

I-D.11

This case was reviewed because of 5 minute Apgar scores of less than 5 at 5 minutes. A 37 year old lady, G3P2, at term with a previous caesarean section was admitted for a trial of labour. This lady progressed smoothly to full dilatation and delivered spontaneously of a vertex presenting baby. Shoulder dystocia was encountered, but this was resolved within 20 seconds. The baby weighed 4601 grams. The baby was found unexpectedly depressed at birth with Apgar scores of 0 at 1 minute, 3 at 5 minutes, and 3 at 10 minutes. The baby was immediately resuscitated with chest compression for five

minutes. Positive pressure ventilation was used. The umbilical artery cord pH was 6.8 with a base deficit of 13.5. The baby did not show any spontaneous movement nor open its eyes until 30 minutes of age. Seizure activity was noted at two hours of age, but an MRI done a few days later showed no evidence of hypoxic ischemic encephalopathy.

The fetal heart rate tracing was reviewed. Concerns were raised regarding the tracing in the second stage of labour. Variable decelerations were noted at the onset of the pushing phase, but subsequently accelerations were noted when bearing down. It appears that the latter part of the fetal heart rate tracing was in fact picking up the maternal heart rate rather than the fetal heart rate. It is likely that the fetal heart rate was in a state of severe bradycardia or nearly absent in that late second stage of labour. The tracing was picking up the maternal heart rate which was misinterpreted as that of the fetus.

This case was classified as theoretically preventable at the level of obstetrical care with in hospital error in management. An educational letter was sent to the Program Team Manager of the maternity unit of the hospital involved to be shared with the nursing staff of the unit.

I-D.12

This case was reviewed for low 5 minute Apgar scores of less than 5 at 5 minutes. A 25 year old G1P0 lady was admitted at 34 weeks gestation with preterm premature rupture of membranes. She was admitted to the antenatal ward, but two days later, due to constipation, was given a fleet enema. While the patient denied any contractions, her abdomen felt tight. When she went to the washroom, she delivered a baby in a breech presentation with Apgar scores of 2 and 5. Because of the location of the delivery, no arterial cord pH was sent.

The Committee was concerned with regards to the fact that the baby's presentation was misdiagnosed as being cephalic when in fact it was a breech. An ultrasound should have been performed at the time of her admission with premature rupture of membranes. Equally, there were concerns with regards to the fact that her contractions and labour may have been missed on the antenatal ward.
This case was classified as preventable at the level of obstetrical care with physician error in judgement. An ultrasound should be performed in cases of preterm premature rupture of membranes to rule out breech presentation. An educational letter was sent to the physician involved and as a result the obstetrical unit initiated a protocol necessitating the performance of an ultrasound when patients present with preterm labour or preterm premature rupture of membranes.

I-D.13

This case was reviewed for inappropriate timing of a caesarean section and resulting in respiratory distress syndrome in the newborn. This was a 25 year old lady, G2P1 delivered by elective caesarean section at 37 weeks by confirmed dates and ultrasound. The baby weighed 3480 grams with Apgar scores of 5 and 7. At two hours of age the baby was noted to be grunting and desaturating and was transported to the Neonatal Intensive Care Unit at the tertiary centre with severe respiratory distress syndrome. The baby spent two weeks in hospital.

The Committee was concerned with regards to the timeliness of the caesarean section. The Manitoba standards for elective caesarean sections is to have those performed at 39 weeks gestation unless fetal lung maturation has been established or there were other compelling reasons to undertake a caesarean section at an earlier gestational age, such as for maternal medical indications, previous classical caesarean section, or cord presentation. The committee felt that this baby's morbidity was theoretically preventable at the level of obstetrical care with physician error in judgement. The physician involved acknowledged that this caesarean section should have been done later, and committee sent an educational letter to the physician.

I-D.14

This case was reviewed for birth trauma and admission to NICU. A 31 year old G3P2 lady known to be Type II diabetic treated with insulin and documented to have a macrosomic infant. Fetal lung maturation was carried out around 36 weeks gestation and elevated amniotic fluid insulin levels were detected. The fetal lung profile was mature and so labour was induced. Labour went well until full dilatation when the fetal heart rate tracing showed onset of variable decelerations for about 6 minutes followed by absence of fetal heart rate. The attending physician came into the patient's room, un-summoned, 10 minutes later to be faced with absence of fetal heart rate with patient fully dilated in an ROT position at +2 station. An operative mid-cavity vacuum extraction took place and the head was delivered with one pull, but shoulder dystocia was then encountered. Delivery of the right posterior arm was then carried out followed by downward traction to deliver the anterior shoulder. The baby weighed 4185 grams with Apgar scores of 2 and 8 and an umbilical cord arterial pH of 7.02 and a base deficit of 5.9. The baby needed positive pressure ventilation for 3 minutes. The baby was found to have a fracture of the right humerus as well as a brachial plexus injury to the left arm. An MRI done on day 6 showed subgaleal hematoma as well as infarcts within the posterior limbs of both internal capsules.

The committee had concerns regarding the techniques used to manage the shoulder dystocia that had resulted in a fracture of the right arm and Erb's palsy on the left arm as well as error in managing the monitoring of the fetal heart rate during the latter part of the labour. The physician was not summoned when the decelerations were noted, nor was the physician summoned after the absence of fetal heart rate for more than 10 minutes. The case was classified as preventable at the level of obstetrical care with both physician error in technique and in hospital error in management. An educational letter was written to the Nurse Manager of the labour floor as well as an educational letter was sent to the physician involved.

I-D.15

This case was reviewed for birth trauma. A 27 year old G1P0 with known Type I diabetes and hypertension underwent an amniocentesis to confirm fetal lung maturation after 36 weeks gestation. A breech presentation was noted at the time of scanning the fetus, so after confirming fetal lung maturation, an elective lower transverse caesarean section was carried out. The baby was noted to be presenting as a sacrum posterior. There were no written or typed notes regarding the technique used in the delivery of this baby or whether there were any difficulties encountered.

The baby was 3300 grams, with Apgar scores of 5 and 8 and an umbilical artery pH of 7.17, but the baby was noted to have a right Erb's palsy. It was noted by the reviewers that the anaesthesiologist note indicated a 6 minute time interval between the uterine incision and the delivery of the baby, suggesting that it is very likely there were difficulties extracting this baby at the time of the caesarean section, which contributed to the development of the Erb's palsy. The committee classified this case as theoretically preventable at the level of obstetrical care with physician error in technique. A letter of education has been sent to the physician involved.

I-D.16

This case was reviewed for birth trauma. A 19 year old nullipara lady known to have pre-eclampsia was induced at 38 weeks gestation. Labour went well, but the second stage was prolonged for 4 hours with a mid-pelvic arrest. The patient was taken to the delivery room for a trial of forceps under double setup. An attempt at spinal anaesthetic for the forceps delivery was complicated by a maternal respiratory arrest and severe hypotension, during which severe fetal bradycardia occurred. A general anaesthetic was then administered. The baby was noted to be in occiput posterior position at +1 station. An attempt at forceps delivery failed to result in any decent or rotation of the fetus, so an emergency caesarean section was carried out.

The baby weighed 3573 grams with Apgar scores of 3 and 8 and an umbilical artery pH of 7.11 and a base deficit of 3. The neonatal course was complicated by the appearance of blood coming out of the baby's ears at 4 hours of age and a CT scan showed bilateral temporal bone fractures and bilateral epidural hematomas. There was no encephalopathy.

The committee felt that the skull fractures were the result of the forceps delivery, likely complicated by excessive traction. The case was classified as theoretically preventable at the level of obstetrical care with physician error in technique and judgement. An educational activity took place with the physician involved.

I-D.17

This case was reviewed for birth trauma. A 33 year old G2P1 lad who was morbidly obese with a BMI of more than 40 presented weighing 376 pounds. She had had a previous caesarean section for a breech presentation and was admitted for a trial of labour on this occasion at 39 weeks gestation. She presented with labour and spontaneous rupture of membranes. She was further augmented with oxytocin and got to full dilatation within an appropriate period of time. After delivery of the head, shoulder dystocia was encountered which resulted with a brachial plexus injury on the side of the posterior shoulder. Baby weighed 4700 grams.

On further review, it appears that this patient had 50 grams of glucose tolerance screen test, the result of which was elevated. She refused to have neither further glucose tolerance tests nor any management for potential gestational diabetes. It is likely that this baby's size may have been affected by the two independent variables of maternal obesity and gestational diabetes. Because the patient had not complied with the recommendation for further sugar testing and/or management of potential

gestational diabetes, this case was classified by the committee as being theoretically preventable at the level of obstetrical care due to patient error in judgement.

I-D.18

This case was reviewed because of neonatal morbidity resulting from inappropriate induction management. A 29 year old G1P0 was induced at 42 weeks gestation. The cervix was unfavourable so Cervidil was used. A day later the cervix was found to be 1 centimeter dilated, still thick and hard. An artificial rupture of membranes was done, which was followed by poor fetal heart variability followed by fetal bradycardia interspersed with episodes of fetal tachycardia. The mother became febrile. Meconium was noted in the fluid during the course of induction.

An emergency caesarean section was done for failing to progress, delivering a baby with Apgar scores of 2 and 4 with a weight of 3600 grams. Thick meconium was noted at birth and the baby was suctioned, received positive pressure ventilation, was intubated and admitted to the NICU.

The committee expressed concerns regarding the proceedings of the induction of labour. It was felt that performing an early artificial rupture of membranes in a nullipara woman with a cervix that is very unfavourable prior to established labour was inappropriate. An educational letter was sent to the physician involved. The case was classified as theoretically preventable at the level of obstetric care with physician error in judgement and management.

I-D.19

This case was reviewed because of neonatal morbidity resulting from neonatal care. A 32 year old G3P2 lady, known to have Type II diabetes was treated with insulin during pregnancy. Spontaneous labour occurred at 37 weeks, culminating a spontaneous vaginal delivery of a baby weighing 4037 grams. Shoulder dystocia occurred at the time of birth. Apgar scores were 2 and 8 at 1 and 5 minutes respectively with an umbilical artery pH of 7.1 and a base deficit of 4.2.

This baby was resuscitated requiring positive pressure ventilation. The neonatal course was complicated by severe hypoglycemia and high concentrated glucose loads had to be administered centrally. The baby was in a state of hyperinsulinemia. On day 3 the baby developed hyponatremia and was noted to be in fluid overload. It appears that the glucose solutions may have been the culprit with large volumes of glucose given without increasing the concentration of glucose in the solution. There were concerns regarding the monitoring of the urine output and monitoring of the electrolyte levels. Fortunately the baby ultimately did well.

The committee expressed concerns regarding the neonatal care, particularly in the administration of the glucose and monitoring of fluid overload and the electrolytes. A letter to the Section Head of Neonatology was sent requesting that this issue be attended by the staff involved. This case was classified as theoretically preventable at the level of pediatric care with physician error in judgement.

I-D.20

This case was reviewed because of neonatal morbidity and admission to the NICU. A 28 year old G4P3 had a spontaneous vaginal delivery at 37 weeks gestation. The mother was known to have been on Effexor. The baby was noted to be jittery with poor feeding. Given that the birth occurred in a rural setting, consultation was made to the neonatologist at a tertiary centre. Unfortunately both centres in the city did not have any neonatal beds at the intensive care units. The baby was subsequently transferred to the NICU after 4 days of calls to the tertiary NICUs. On further assessment of the mother she admitted to substance abuse and was admitted for rehabilitation for 3 weeks.

The committee felt that the neonatal course of this child could have been theoretically preventable with patient error in judgement. Concerns were also expressed regarding issues of availability of neonatal resources for the management of this child at a tertiary centre. A letter to the Section Head of Neonatology was sent, expressing concerns regarding resource issues.

I-D.21

This case was reviewed because of neonatal morbidity with the baby being admitted to the NICU. A 28 year old G5P3 lady delivered spontaneously at 38 weeks gestation of a live baby weighing 2900 grams with Apgar scores of 6 and 8. The mother was on methadone treatment throughout her pregnancy. The baby had significant narcotic withdrawal symptoms and needed to be in the NICU for 1 month.

This case was classified as theoretically preventable with patient error in judgement.

I-D.22

This case was reviewed because of low 5 minute Apgar scores. A 20 year old G1 presented at 28 weeks gestation in active labour. This lady had no prenatal care. She was brought in by ambulance from home. During the transport a partial breech delivery occurred with the delivery completed at the time of arrival to the hospital. The baby had poor Apgar scores of 1, 2 and 5 at 1, 5 and 10 minutes. The birth weight was 1190 grams. The baby suffered grade III intraventricular hemorrhage and hydrocephalus requiring shunting. The staff at the hospital were also surprised that a second twin was being delivered as well. Twin B did well, fortunately, with Apgar scores of 9 and 9 and weighing 1148 grams.

This lady had an undiagnosed twin secondary to lack of prenatal care. The outcome of Twin A may have been different had she had prenatal care. The 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 because of maternal mortality, secondary to H1N1 virus. A 17 year old G1P0 lady presented at 35 weeks gestation with several days of respiratory tract illness and shortness of breath. She was admitted to the Emergency Department at a tertiary centre, and was found to be hypotensive and required intubation. The baby was noted to be dead in utero and a caesarean section was performed. The mother then received extracorporeal membrane oxygenation (ECMO) after her nasal pharyngeal swabs were positive for the H1N1 virus. She sustained acute renal failure, acute hepatic failure, acute respiratory distress syndrome and sepsis. Her condition did not improve on ECMO and it was decided to withdraw care. Her autopsy showed consolidated hemorrhagic lungs, fatty liver, kidney failure, fat necrosis of the mesentery and associated ischemia of the small intestine.

This unfortunate case was classified as non-preventable and unavoidable.

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

II-B.1

This case was reviewed because of maternal admission to the Intensive Care Unit, secondary to postpartum systemic inflammatory response syndrome. A 31 year old G1P0 was induced at 38 weeks gestation of a twin pregnancy which was conceived through advanced reproductive technology. The delivery went well and both twins had good Apgar scores. Twin B was a breech extraction complicated with bilateral nuchal arms.

The mother suffered postpartum hemorrhage of approximately 2 litres; however, two hours postpartum she became agitated and confused with severe maternal tachycardia reaching upwards of 160 beats per minute. She was also hypotensive with a blood pressure of 90/30 mmHg. She was not hypoxemic. She was transferred to the intensive care unit. An echo of her heart showed normal hyperdynamic cardiac state. A CT-scan of her head showed mild cerebral edema; however, she was noted to have low platelets and very elevated liver enzymes.

She was diagnosed as having suffered postpartum systemic inflammatory response syndrome. Other differential diagnoses included partial HELLP syndrome, with hypotension and tachycardia being secondary to blood loss. There was no evidence of sepsis. This was an unusual postpartum course. It was felt that this case was non-preventable and unavoidable.

II-B.2

This case was reviewed because of maternal antepartum congestive heart failure. A 41 year old G5P4 was noted at 34 weeks gestation to have elevated blood pressures and was started on labetalol. On her pre-operative visit her blood pressure was noted to remain elevated at 194/101 mmHg, at which time she was transferred from the rural area to a tertiary centre in the city. She developed shortness of breath with an oxygen saturation of 87% and was noted to be in congestive heart failure documented by x-ray. She was treated with diuretics, beta blockers, calcium channel blockers and vasodilators. Nephrology, Cardiology, and General Internal Medicine were involved in her care. She was diagnosed to have had severe gestational hypertension.

At 36 weeks gestation she was induced for delivery of a live baby weighing 2250 grams with Apgar scores of 7 and 7. She was subsequently followed up in the congestive heart failure clinic. This case was classified as non-preventable and unavoidable.

II-B.3

This case was reviewed for postpartum hysterectomy. This lady had fetal demise at 19 weeks gestation and was delivered in a rural setting. She had two episodes of delayed postpartum hemorrhage which could not be controlled, necessitating a hysterectomy. Pathology showed uterine

arterial venous malformation with large vessels distributed throughout the stroma. It was felt that her postpartum hysterectomy was non-preventable and unavoidable.

II-B.4

This case was reviewed because of peripartum caesarean hysterectomy. A 34 year old lady, G8P6 was diagnosed with placenta previa. She was admitted at 34 weeks gestation with spontaneous rupture of membranes and bleeding. On fetal assessment scanning placenta percreta was suspected. A caesarean hysterectomy was planned. At the time of her surgery, placenta percreta was confirmed with a placenta invading the bladder wall. She sustained significant blood loss, estimated at 4 litres. Surgical expertise from gynecology oncologists was also available at the time of surgery. The management of this case was felt to have been satisfactory with a case classification of non-preventable and unavoidable.

II-B.5

This case was reviewed for a peripartum hysterectomy. A 34 year old G3P2 lady presented at 37 weeks gestation with antepartum hemorrhage. The placental edge was 3 centimeters from the internal cervical os. She had a normal vaginal delivery but then sustained secondary post-partum hemorrhage. This was treated medically with oxytocin, misoprostol and carboprost. Balloon uterine tamponade was also undertaken; however, bleeding could not be controlled. She sustained 2 ½ litres of blood loss and had to be transfused. Her deteriorating course necessitated a peripartum hysterectomy to save her live. Pathology found that the bleeding source was from the lower uterine segment an area of poor contractility. This case was classified as non-preventable and unavoidable.

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

II-C.1

This case was reviewed for a neonatal death. A 24 year old G1P0 lady was admitted to hospital at 40 weeks gestation with ruptured membranes. She was 2-3 centimeters dilated. Oxytocin was initiated, and she progressed appropriately achieving full dilatation. During the second stage of labour she pushed for two hours; however, the baby was in an ROP position, at which time it was decided to have her epidural topped up for a period of rest before she resumed pushing. During this period of rest, an unprovoked bradycardia occurred. She was immediately transferred to the case room and the baby was delivered by forceps. The interval of time between the onset of the bradycardia and the actual delivery of the baby was 22 minutes.

The baby was born with Apgar scores of 0, 2, and 3 at 1, 5 and 10 minutes. The umbilical artery cord pH was 7.16. The neonatal resuscitation was complicated by difficult intubation. The hospital standards committee as well as the MPHSC reviewed the fetal heart rate tracing prior to the profound bradycardia. The tracing was reasonable. The obstetrical management of the patient was felt to have been satisfactory. The response to the onset of bradycardia was appropriate and timely. The baby suffered hypoxic ischemic encephalopathy and succumbed on day 29 of age.

The committee felt that the management was appropriate. While this outcome was unfortunate, the case was classified as non-preventable and unavoidable.

II-C.2

This case was reviewed for neonatal mortality. A 17 year old G1P0 lady residing in a rural setting presented to her nursing station with cough and shortness of breath at 35 weeks gestation. She became quite hypoxemic and she needed to be intubated and transferred to a tertiary centre in the city. An ultrasound done upon arrival demonstrated intrauterine fetal death. A caesarean section had to be performed in the hope of improving maternal ventilation. Post-operatively the patient suffered cardiac arrest and needed to be resuscitated and was placed on extracorporeal membrane oxygenation (ECMO). She subsequently was managed by the perfusion service and survived her ordeal.

The committee felt that the fetal death was secondary to maternal hypoxemia, secondary to an acute maternal respiratory illness. The case was classified as non-preventable and unavoidable.

II-C.3

This case was reviewed for neonatal death following uterine rupture. A 25 year old G5P3 lady presented in active labour with a past history of caesarean section for a placenta previa and subsequent vaginal birth after caesarean section. Labour was slow so she was augmented with oxytocin in increasing dosages. Acute bradycardia occurred during labour and she was immediately rushed to the operating room where, upon caesarean section, it was evident that she sustained a rupture of the uterus.

The baby was born with Apgar scores of 1 and 0 at 1 and 5 minutes. The resuscitation efforts failed to revive the baby, which, on autopsy, was documented to be a full term female infant at 40 weeks gestation with no congenital malformations.

The case was reviewed by the hospital committee as well as by the MPHSC and it was felt that the obstetrical management of this patient was appropriate. There were some concerns in that the oxytocin dosages were increased despite adequate response to lower doses; however, uterine rupture in the context of a trial of labour after a previous caesarean section does occur and may be independent of the oxytocin administration in this particular case. The case was classified as non-preventable and unavoidable.

II-C.4

This case was reviewed for neonatal mortality. A 22 year old G2P1 lady presented at 35 weeks gestation with a 1 day history of spontaneous preterm rupture of membranes and contractions. She was noted to have a breech presentation and while preparations were being made for a caesarean section for a non-reassuring fetal heart rate monitoring, she delivered the breech vaginally with Apgar scores of 1, 4, and 8 at 1, 5 and 10 minutes. The umbilical arterial blood gasses were not obtained. Unfortunately, the baby demonstrated occipital hemorrhage on an MRI done on day 1 of life. The baby subsequently became hypotonic and less reactive with absent gag reflex and irregular breathing. The baby was placed on palliative care and died on the 6th day of life.

This neonatal death was felt to be secondary to hypoxic ischemic encephalopathy with hemorrhagic complication. The obstetrical management and neonatal managements were felt to be appropriate and the case was classified as non-preventable and unavoidable.

II-C.5

This case was reviewed for an intrapartum stillbirth. A 27 year old G3P2 lady with morbid obesity and poorly controlled gestational diabetes requiring insulin was induced at 36+ weeks gestation as the baby was noted to be quite macrosomic at greater than the 90th percentile for gestational age. The amniotic fluid insulin levels were high. The labour was complicated by the need for a vacuum extraction at +2 station, secondary to maternal exhaustion. Severe shoulder dystocia was encountered. At birth the infant was pale and hypotonic with Apgar scores of 0, 0, and 0 at 1, 5 and 10 minutes. The neonatal heart rate was obtained at 12 minutes of age; however, this was followed by deteriorating bradycardia and low oxygen levels in the newborn, resulting in neonatal death.

On autopsy the baby had cardiomegaly with biventricular hypertrophy. There was small left subdural hemorrhage and hemoperitoneum due to ruptured subcapsular liver hematoma. There was a fracture of the right humerus and bilateral chest wall hemorrhages. The umbilical arterial pH was 7.05 and the baby's weight was 4285 grams.

The hospital review committee and the MPHSC classified this case as non-preventable and unavoidable with neonatal death secondary to cardiomegaly with biventricular hypertrophy.

II-C.6

This case was reviewed for a stillbirth in the context of Type II diabetes treated on insulin with poor control. A 35 year old G4P2 lady with Type II diabetes treated on insulin with relatively poor control was admitted to hospital at 28 weeks gestation for controlling of her blood sugar. She was subsequently followed up by the fetal assessment unit with regular scans at two week intervals. She returned at 36 weeks gestation. She was to report to fetal assessment for a planned amniocentesis at which time a stillbirth was discovered. Her labour was induced and the baby was in the breech position. The baby weighed 8 pounds 3 ounces. The baby was noted to have a cleft lip and palate. A true knot was also noted on the cord.

The hospital review committee as well as the MPHSC were unclear as to the cause of the stillbirth but speculated that the poorly controlled diabetes contributed to this fetal death. On her final fetal assessment the baby was over the 90th percentile for gestational age and amniotic fluid was generous with 11 centimeter pockets. Questions were raised with regards to the frequency of the fetal assessments on this patient; however, it was deemed by independent reviewers that the frequency of the fetal assessments was appropriate and as such the case was classified as non-preventable and unavoidable.

II-C.7

This case was reviewed for a stillbirth in the context of Type II diabetes. A 15 year old G1P1 lady known to be Type II diabetic with poor diabetic control had an audible fetal heart rate in the office the day prior to her planned induction of labour at 38 weeks and 3 days. She had been followed by the fetal assessment unit and the baby was of average size. Unfortunately, on the day of her induction, she was noted to have a stillbirth and her blood sugars in the 20 mmol/L range. The baby's weight was 3700 grams.

The autopsy showed bilateral focal pneumonia and Group B streptococus was aspirated from cardiac blood. The cause of the death was felt to be a Group B streptococcal sepsis even with intact membranes. The underlying diabetes may have been a contributing factor in promoting the infection. This case was classified as non-preventable and unavoidable.

II-C.8

This case was reviewed for neonatal mortality in a twin pregnancy. A 33 year old G1P0 known to have a dichorionic diamniotic twin pregnancy was being treated in the pregnancy with Fragmin due to protein C deficiency. She was admitted to one of the tertiary centres with cervical shortening at 23

weeks gestation following which she received betamethasone to accelerate fetal lung maturation and indomethacin for increasing uterine contractions.

Overnight, she unfortunately continued to contract and was noted to be fully dilated; however, the NICU unit at the tertiary centre was closed to preterm infants, and as such, the patient had to be transferred to the second tertiary centre in the city. Twin A delivered shortly after arrival with Apgar scores of 4 and 6; however, neonatal resuscitation initially was initiated but subsequently discontinued due to extreme prematurity at 24 weeks gestation. Twin B was subsequently delivered spontaneously and was a stillborn.

Concerns were raised by the MPHSC as well as by the hospital standards committee with regards to transferring this patient with a twin pregnancy at near viability at full dilatation from one tertiary centre to another. There were also issues of neonatal documentation and communication of planned management on this patient should she deliver even though neonatology service was appropriately consulted by the obstetrician and the patient's input was obtained. This lack of neonatal documentation pertained to whether resuscitation will be attempted or not. As a result of these concerns, a Critical Incident Review pertaining to communication and documentation was initiated at both tertiary centres. Despite these concerns, it was felt that the twin perinatal deaths were non-preventable and unavoidable.

II-C.9

This case was reviewed for neonatal mortality. A 24 year old G3P2 lady with two previous caesarean sections transferred to Winnipeg for an elective repeat caesarean section. When she was seen in the preoperative clinic at 38 weeks gestation she was noted to be having a severe respiratory tract infection. She presented to the labour floor three days later with vaginal bleeding and contractions, but she was also noted to be hypoxic. She was immediately taken to the operating room where an emergency caesarean section was performed.

The baby had Apgar scores of 0, 1 and 1 at 1, 5 and 10 minutes. The cord arterial pH was 6.7 with a base deficit of 19.4. The neonatal course was complicated by multi-organ dysfunction and life support was withdrawn on the second day. The autopsy demonstrated hemorrhagic necrosis of the brain, liver, kidneys, and adrenals. Further workup on the mother showed that her upper respiratory tract infection was an H1N1 influenza. This lady was one of the earliest cases to show up with the H1N1 epidemic in the province. The case was classified as non-preventable and unavoidable.

Further Cases

There were 7 other cases of perinatal mortality that were reviewed by the MPHSC committee and were classified as non-preventable and unavoidable. These included:

- 1 case of neonatal death with trisomy 18.
- 1 case of a stillbirth felt to be secondary to a true knot on the cord.
- 4 cases of neonatal death secondary to extreme prematurity with deliveries occurring prior to 24 weeks gestation.
- 1 case of neonatal death felt to be secondary to sudden infant death syndrome (SIDS).

Non-Preventable and Unavoidable:
Perinatal Morbidity

II-D.1

This case was reviewed for neonatal seizures. A 26 year old G3P0 lady presented at 39 weeks gestation in spontaneous labour. She was augmented with oxytocin. There was thick meconium noted during labour. The fetal heart rate remained normal. At birth there was a tight nuchal cord. The baby had Apgar scores of 1 and 6, but with an umbilical arterial cord pH of 7.28 and a base deficit of 8. The baby was intubated but no meconium was noted below the cords.

At a few hours of age, the baby developed abnormal left sided movements observed by the mother. The baby was subsequently transferred to the NICU and treated with phenobarbital and phenytoin. EEG showed abnormal activity, and an MRI showed acute subcortical non-hemorrhagic infarction of a distribution consistent with a global ischemia. Given that the fetal heart rate as well as the umbilical arterial cord pHs were normal, it is possible that this ischemia occurred prior to labour. There were no concerns raised in the obstetrical management of this case, and the case was hence classified as non-preventable and unavoidable.

II-D.2

This case was reviewed for neonatal seizures and admission to NICU. A 28 year old G1P0 lady with an uncomplicated pregnancy presented at 38 weeks gestation in spontaneous labour. Her labour was complicated by a prolonged second stage of 4 ½ hours. The fetal head remained at the perineum for nearly 40 minutes. This patient refused to have an episiotomy or any instrumental assisted vaginal delivery to shorten the second stage.

Upon delivery, the baby had Apgar scores of 4 and 9 with an umbilical arterial pH of 7.08. At 15 hours of age the baby developed tonic clonic seizures and the baby was transferred to NICU. An EEG was normal and an MRI showed multiple areas of cortical infarction with a small subdural hematoma. Phenobarbital therapy was initiated and the baby did ultimately well and was discharged home at 15 days of age. The fetal heart rate throughout labour had been satisfactory and normal.

It was unfortunate that the fetal head had to stay on the perineum for a prolonged period of time; however, this was contributed by the patient's refusal for any intervention. Equally, the fetal heart rate tracing did not mandate an expedited delivery. As such, this case of neonatal seizure was classified as non-preventable and unavoidable.

II-D.3

This case was reviewed because of neonatal seizures and low 5 minute Apgar scores. An 18 year old G1P0 lady presented with spontaneous premature rupture of membranes at 39 weeks gestation. Labour was induced and was exemplary with a 12 hour first stage and 46 minutes for the second stage.

The delivery was spontaneous of a live baby weighing 3274 grams. The Apgars were 1, 2 and 7 at 1, 5 and 10 minutes. The umbilical arterial pH was 7.17 and a base deficit of 4.1.

Neonatally the baby had respiratory desaturations. On day 6 the baby had seizures. An MRI of the brain on day 7 showed an area of acute infarction in the right middle cerebral artery area. The committee felt that this was a case of perinatal arterial stroke, and as such the neonatal seizure was felt to be non-preventable and unavoidable.

II-D.4

This case was reviewed for neonatal seizures. A 17 year old G1P0 lady presented with premature rupture of membranes at 41 weeks gestation. She was induced with oxytocin. Thick meconium was noted with a rupture of membranes. Unfortunately the fetal heart rate tracing was unavailable for review; however, judging from the physician and nurses' notes, there were no concerns with the tracing. The mother had a prolonged second stage of labour for which Simpson forceps were used. The Simpson forceps were done without difficulty for a LOA position and station +2. Moderate traction was required. The total duration of forceps applications was 4 minutes.

The baby was born with Apgar scores of 7 and 8 with an umbilical arterial cord pH of 7.21 and weighed 3824 grams and was sent to the normal nursery. On day 2 the baby was noted to have seizures and was retransferred to the NICU. Septic workup was negative and an MRI showed a non-hemorrhagic infarction in the territory of the left middle cerebral artery. The baby was treated with phenobarbital and was sent home on day 11 of life on phenobarbital. The cause of the infarct is unknown.

Even though the fetal heart rate tracing was missing from the review, the baby appeared to have been born in good condition and the umbilical arterial pHs and Apgar scores were normal. The case was hence classified as non-preventable and unavoidable.

II-D.5

This case was reviewed for low Apgar scores and neonatal seizures. A 37 year old G2P0 lady had a smooth pregnancy. The mother was obese. She presented at 41 weeks gestation with labour; however, on admission the fetal heart rate tracing was non-reassuring. Artificial rupture of membranes was done and thick meconium was noted. The patient reported decreased fetal movement for the past 24 hours prior to labour. She was immediately taken to the case room where an emergency caesarean section was done; however, it was slightly delayed due to maternal habitus.

The baby was born with Apgar scores of 2, 3 and 4 at 1, 5 and 10 minutes. The cord arterial pH was 6.9. A review of the course in labour and management of the case was felt to have been appropriate. Unfortunately maternal obesity precluded a more rapid caesarean section but it is likely that this baby was acidotic at the onset of labour. The committee felt that the case was non-preventable and unavoidable.

II-D.6

This case was reviewed for low 5 minute Apgar scores and hypoxic ischemic encephalopathy. A 24 year old G2P1 lady with a previous elective caesarean section because of an obstructing ovarian tumor, wished to have a trial of labour with the current pregnancy. Following a smooth pregnancy she became overdue. She had regular fetal assessments, and non-stress tests that remained reactive. It was decided to have her induced at 42 weeks and 3 days given her strong desire to go into spontaneous labour in the context of her previous caesarean section, unfavourable cervix and normal biophysical profiles and non-stress tests.

On the day of her planned induction she presented in active labour. The fetal heart rate tracing was initially normal, but then had an episode of acute bradycardia down to 60 BPM. It took 15 minutes before she arrived in the operating room and the baby was delivered 14 minutes later by an emergency caesarean section. Thick meconium was noted at the time of birth. There was no evidence of uterine rupture, abruption or cord complications.

The baby weighed 3500 grams and was born with no respiratory efforts and no tone. Thick meconium was noted below the cords requiring repeated suctioning. The Apgar scores were 1, 2 and 2 at 1, 5 and 10 minutes. The umbilical arterial pH was 6.8 with a base deficit of 11.9. The baby was taken to the NICU and intubated. At 16 hours of age the baby showed normal tone and activity. There was no evidence of a seizure. An EEG showed marked defuse CNS dysfunction. An MRI done at 3 days of age showed infarction in the right parietal and occipital region.

The obstetrical management of this case was felt to have been appropriate even though there was some expression of concern that it took 29 minutes to deliver the baby after the onset of the bradycardia. The committee felt that the induction of labour at 42 weeks and 3 days was appropriate and that the acute bradycardia was unpredictable and unpreventable and the subsequent management was relatively acceptable. The case was classified as non-preventable and unavoidable.

II-D.7

This case was reviewed for low Apgar scores and admission to the NICU. A 19 year old G1P0 lady presented at 41 weeks gestation with a premature rupture of membranes. Induction of labour was initiated. At 24 hours of ruptured membranes she developed fever and fetal tachycardia in labour. At that time she was 7 centimeters dilated, and as such she underwent an emergency caesarean section for delivery of a baby whose weight was 4017 grams with Apgar scores of 3 and 4 with an umbilical arterial cord pH of 7.25. The baby was admitted to NICU for observation and cultures. The neonatal cultures were negative and the baby was sent home on day 4.

On further review, the fetal heart rate was in tachycardia with decreased variability for 45 minutes prior to the caesarean section; however, the caesarean section, while called for, could not be performed as there was another caesarean section happening simultaneously on the Labour Floor. The outcome of this baby was ultimately good. This baby's admission to the NICU was non-preventable and unavoidable.

II-D.8

This case was reviewed for neonatal admission to the NICU. A 31 year old G1P0 lady presented at 40 weeks gestation with premature rupture of membranes. She was augmented with oxytocin and ended with a normal vaginal delivery. The baby had Apgar scores of 1 and 6 and required positive pressure ventilation for 3 minutes. The arterial cord pH was 7.22; however, the baby was noted to be neonatally depressed and was admitted to the NICU where the baby spent two days. There was a tight nuchal cord noted at the time of delivery.

The obstetrical management was noted to have been appropriate and the case was classified as non-preventable and unavoidable. Incidentally the discharge summary by the neonatologist indicated that this baby had birth asphyxia; however, the baby did not meet the criteria for birth asphyxia, so an educational letter was sent to the pediatrician involved to change the diagnosis and was reminded of the criteria necessary to label a newborn as having suffered birth asphyxia.

II-D.9

This case was reviewed for low 5 minute Apgar scores. A 38 year old G3P1 lady presented in spontaneous labour at 41 weeks gestation with a cervical dilatation of 9 centimeters. Thick meconium was noted and the intermittent auscultation was initiated. Delivery was a normal vaginal delivery, but there was a cord noted to be wrapped around the shoulder of the baby. The arterial cord pH was 7.16 and the Apgar scores were 4, 5, and 7 at 1, 5 and 10 minutes. The baby was admitted to the NICU with Transient Tachypnea of the Newborn and small bilateral pneumothoraces. The obstetrical care was felt to have been satisfactory and the case was classified as non-preventable and unavoidable.

II-D.10

This case was reviewed for neonatal admission to the NICU. A 32 year old G5P2 lady presented in spontaneous labour at term. During labour she developed a fever and was treated with antibiotics. Meconium was noted. At birth the baby had Apgar scores of 1 and 7 with an umbilical arterial cord pH of 7.17. On further review, this lady was given morphine 4 hours prior to delivery, necessitating the use of Narcan and positive pressure ventilation when the baby was noted to be depressed at birth. Unfortunately, the baby developed ongoing respiratory distress that was diagnosed to be secondary to a large pneumothorax. The baby ultimately did well.

The case was felt to be non-preventable and unavoidable. It did, however, raise concerns on the use of morphine in labour. Since then, the hospital has switched to the use of the shorter acting Fentanyl as a method of narcotic pain control; however, Fentanyl does require 1:1 nursing, which may be a problem when narcotics are needed in the triage area. In the face of a lack of resources for 1:1 nursing in the triage area, it was advised that the laboring woman be transferred out of the triage to the Labour Floor in a timely manner, particularly when narcotics are required to control pain. A letter was sent to the directorship of the woman and child program at the hospital involved to alert them to the possibility of neonatal problems with use of longterm narcotics for the mother, especially if delivery occurs within a short period of administration of the drug. Expediting admission to the labour floor for 1:1 nursing was also stressed especially if short term narcotics are needed.

II-D.11

This case was reviewed for low 5 minute Apgar scores and admission to the NICU following a spontaneous placental abruption. A 24 year old G1P0 lady presented at 36 weeks gestation to the triage area with constant abdominal pain and a pounding headache. Her blood pressure was 134/87 mmHg. Her pulse was 88 beats per minute. The patient was initially attended by a junior resident. Fetal heart rating monitoring was initiated, but that showed a baseline of 130 BPM and decelerations were noted over a span of 18 minutes. At that point, there was difficulty in picking up the fetal heart rate and it took nearly 15 minutes before a senior obstetrical faculty was summoned.

A bedside ultrasound was done showing that the fetal heart rate was indeed in bradycardia at 50 BPM. The patient was immediately taken to the operating room and a general anesthesia was begun 11 minutes after being transferred from triage. Delivery occurred 7 minutes later. At the time of the caesarean section, a large placental abruption was identified. The baby weighed 3370 grams, but was found to be unresponsive with no fetal heart rate. An umbilical arterial cord pH was 6.6 with a base deficit of 24. Aggressive resuscitation was initiated and a newborn heart rate was established.

The baby remained hypotonic and was put on a hypothermia protocol for 72 hours. An EEG showed background activity severely attenuated with no reactivity. An MRI done on day 5 reported small infarct within the right posterior lateral brain stem superior to the right cerebellum peduncle. The baby was discharged on day 20 on phenobarbital and was feeding well.

In retrospect, this lady's constant abdominal pain was likely secondary to the abruption of placenta. There was some concern expressed by the review committee with regards to the delay of summoning a senior obstetrical faculty when the fetal heart rate was noted to be in bradycardia; however, once the decision was made to take the mother to the operating room for an emergency caesarean section things were expedited in an acceptable manner.

The hospital committee and the MPHSC felt that the case was non-preventable and unavoidable. Letters were sent to the Director of the women's program at the hospital involved with regards to implementing the "escalation protocol" when significant events are unfolding.

II-D.12

This case was reviewed for possible neonatal seizures. A lady was induced at 36 weeks gestation for maternal gestational diabetes. The delivery was a spontaneous vaginal delivery and the baby weighed 3431 grams with Apgar scores of 8 and 9, a cord arterial pH of 7.15 and a base deficit of 3.5. The baby was noted to be hypoglycemic at birth and was admitted to the intermediate nursery for treatment. At 36 hours of age, there were possible jittery movements on the right side. An EEG was nonspecific. An MRI done at 8 weeks of age showed evidence of multiple previous hemorrhages in or around the lateral ventricles and parenchymal hemorrhages were also noted on the right parietal lobe and periventricular region of the posterior fossa. The etiology was unclear. This case was classified as non-preventable and unavoidable.

II-D.13

This case was reviewed for neonatal admission to the NICU with respiratory distress syndrome. This was a 30 year old G5P4 lady with a previous caesarean section who was admitted at 39 weeks gestation for elective repeat caesarean section. The dates were confirmed by history and early ultrasound.

The baby's Apgar scores were 1 and 2 at 1 and 5 minutes. The umbilical cord pH was 7.19 with a base deficit of 2.5. The umbilical venous pH was 7.3 with a base deficit of 4. The baby was not breathing at birth and required positive pressure ventilation and high pressures were needed to ventilate the baby even after intubation. The baby was kept in NICU intubated and ventilated for 10 days. The diagnosis was that of surfactant production deficiency in the fetus resulting in neonatal respiratory distress syndrome.

The committee felt that the management in this case was appropriate. Perhaps this respiratory distress syndrome may have been prevented by delaying the caesarean to 40 weeks; however, the management of this case met standards and that the caesarean was done at 39 weeks, hence the case was classified as non-preventable and unavoidable.

II-D.14

This case was reviewed for a fractured left humerus. A 44 year old G5P3 lady was in spontaneous labour at term. Severe recurrent variable decelerations were noted when she was 4 centimeters dilated. She was taken to the operating room for an emergency caesarean section under general anaesthetic; however, following the delivery of the fetal head through the incision, there was difficulty with delivery of the baby's shoulders. The baby's left wrist, which was positioned posteriorly, was grasped, and the arm brought out through external rotation. The baby weighed 2790 grams, with Apgar scores of 5 and 9 at 1 and 5 minutes and an umbilical cord pH of 7.25. The baby sustained a fractured left humerus.

The committee deliberated at length on whether the humerus fracture was the result of poor technique, or whether this was an acceptable complication when faced with delivering the posterior arm during severe shoulder dystocia to avoid a brachial plexus injury from excessive traction on the fetal neck. In the final analysis the committee felt that the case was non-preventable and unavoidable, but the obstetrician involved was informed of the committee's concerns.

II-D.15

This case was reviewed for neonatal Erb's palsy. A 29 year old G2P1 lady presented in spontaneous labour at 37 weeks gestation and was subsequently augmented with oxytocin. Her first and second stages of labour were appropriate in duration; however, at the time of delivery severe shoulder dystocia occurred, and it took four minutes to have the shoulders delivered after delivery of the head. The normal routine maneuvers for management of shoulder dystocia were undertaken. The baby sustained Erb's palsy. The baby's weight was 3910 grams, which was substantially larger than the

mother's first baby, who weighed only 2948 grams. The Apgar scores were 5 and 9 and the umbilical cord arterial pH was 7.15. The case was classified as non-preventable and unavoidable.

Further Cases

There were two other cases of perinatal morbidity that were reviewed for shoulder dystocia and fractured humeri, both involving delivery of the head followed by severe shoulder dystocia. Both involved management of the shoulder dystocia by manual removal of the posterior arm through posterior arm axilla traction and both resulted in fracture of the humerus. The first baby weighed 4114 grams and the second was 4745 grams. Both had good Apgar scores and cord pHs. The cases were classified as non-preventable and unavoidable.

There were two cases of neonatal morbidity secondary to neonatal anomalies for which the babies were admitted to the NICU, one with liver hemangioma and the other with diaphragmatic hernia. Both were classified as non-preventable and unavoidable.

Finally, there were three cases reviewed for neonatal meconium aspiration, all of which necessitated the admission of the newborn to the NICU. All were classified as non-preventable and unavoidable.

III. Unclassifiable Cases

III-C.1

This case was reviewed for a neonatal mortality. A 30 year old G3P2 lady was delivered at 38 weeks gestation by elective caesarean section of a healthy newborn baby with Apgar scores of 9 and 9 and an umbilical cord pH of 7.23. The baby weighed 2668 grams. At 28 hours of age, the baby photographer notified the nursing staff that the baby was not behaving appropriately and did not appear healthy. The baby was attended to by the nursing staff and was noted to be lifeless. The baby was immediately taken to the NICU for failed resuscitation attempt. An autopsy was done but the cause of death remained unknown.

Of note is that 30 minutes prior to this event, the baby was checked by the nursing staff and allegedly the baby appeared well; however, the father in retrospect admitted that the baby felt cold in his arms for some time. The cause of the neonatal death was never confirmed. As a result of this case, a Critical Incident Review occurred at the institution involved and the recommendations from that were to increase family education around recognizing neonatal distress. The case could not be classified and the preventability is unknown.

III-C.2

This case was reviewed for an intrapartum stillbirth. A 29 year old G1P0 lady whose pregnancy was uneventful and was being cared for by a midwife was planning to have a home delivery. The mother went into spontaneous labour throughout the day and had regular strong labour six hours after the onset. A midwife was subsequently summoned two hours after labour became strong. When the midwife arrived, she was unable to obtain fetal heart sounds so the patient was taken out of the bathtub where she had been laboring and a second midwife was summoned to assist. Outside the bathtub it was noted that the fetal heart rate was a range between 143 BPM to 130 BPM. The mother became fully dilated shortly after the arrival of the midwife.

The baby was born vaginally spontaneously, but was flat at birth with Apgar scores of 0 and 0. The baby was covered in meconium. There was no tone and no heartbeat. A gastric tube was inserted and suctioning of thick meconium was done. EMS was called and further resuscitation efforts by the EMS including intubation, and subsequent resuscitation by the hospital personal were not successful. The autopsy was negative. It is unfortunate that the midwives were not summoned by the patient until late in labour. This case could not be classified as to causation and preventability was uncertain.

III-C.3

This case was reviewed for low 5 minute Apgar scores. A 26 year old G2P0 lady presented in spontaneous labour at 41 weeks gestation. Her labour arrested at 8 centimeters dilatation and she needed augmentation. The fetal heart rate tracing was documented to be reassuring throughout the first and the second stage according to progress notes; however, the actual fetal heart rate tracing was not available for review. The baby delivered spontaneously and weighed 3924 grams, but had Apgar

scores of 1 and 1 at 1 and 5 minutes. The umbilical cord pH unfortunately was not available either. The cord venous pH was 7.31 with a base deficit of 7.4.

The baby required positive pressure ventilation and chest compressions and at 5 minutes of age, the baby needed intubation and responded quickly to this intervention. The committee felt that there was likely an element of metabolic acidosis at birth, but this could not be confirmed as neither the umbilical cord artery pH was available nor was the fetal heart rate tracing available for review. The committee could not classify this case, and hence this case is unclassifiable.

III-C.4

This case was reviewed for a stillbirth. A 26 year old G4P3 lady had a smooth pregnancy and presented at 40 weeks gestation with fetal demise. She delivered spontaneously of a 3153 gram stillborn. The workup showed E. coli in the blood and lung tissue obtained from the baby. The placental pathology showed acute chorioamnionitis.

Of note is that this lady presented to the triage three days earlier with decreased movements. The non-stress test allegedly was reactive but was not available for review by the committee. She again presented one day prior to the stillbirth, and again, apparently the non-stress test was marked reactive but not available for review neither by the hospital nor by MPHSC. At her time of admission for labour, the documentation was noted to be poor with no written history or physical examination and there was no delivery note. Several attempts were undertaken to obtain the non-stress test strips without success. If the tracings were indeed reactive, then the case would have been classified as non-preventable and unavoidable, but the case remains unclassifiable as these tracings could not be reviewed.

While the case was unclassifiable, a letter of education was sent to the physician involved with regards to the inappropriate documentation of the evaluations prior to labour and of the labour and delivery event.

Statistical Summary

Causes of Perinatal and Late Neonatal Mortality

The following table is representative of the cases reviewed by the MPHSC that occurred in 2009 and 2010.

Causes of Perinatal and Late Neonatal Mortality	2009	2010
Stillbirth*	139	141
Fatal Anomalies	17	11
Genetic Anomalies	5	8
Perinatal Hypoxia / Acidosis / HIE / Asphyxia / Cardiorespiratory Failure	7	9
Perinatal Sepsis	4	4
Extreme Prematurity	26	54
Placental Insufficiency	1	0
Unknown	2	0

Source: MPHSC Database
*Source: Vital Statistics Annual Report 2010-2011

Neonatal Morbidity

The following table represents neonatal morbidity cases that were reviewed by the MPHSC that occurred in 2009 and 2010.

Neonatal Morbidity	2009	2010
Acidosis / Low 5 Minute Apgar Score	82	53
Encephalopathy / Seizures	18	9
Respiratory Distress Syndrome	8	9
Meconium Aspiration / Persistent Pulmonary Hypertension of Neonate / Pneumonia / Pneumothorax / Sepsis	19	23
Transient Tachypnea of the Newborn	12	7
Trauma	47	33
Hypoglycemia / Hyperglycemia / Hyperbilirubinemia	4	5
Bradycardia	3	2
Substance Withdrawal	2	4
Abnormalities / Genetic Disorders	21	12
Prematurity (Other than RDS)	4	1
ABO Incompatibility / Rh Disease / Hydrops	1	1
Other (includes IUGR, Prolonged NICU Stay)	9	18

Source: MPHSC Database

Maternal Morbidity

The following table represents categories of the maternal morbidity cases that were reviewed by the MPHSC that occurred in 2009 and 2010.

Maternal Morbidity	2009	2010
Hemorrhage – APH / PPH / Abruptio	3	5
Hypertension Related Morbidity	8	4
Infectious Morbidity / Sepsis / Septic Shock	8	4
Thrombotic Morbidity	1	2
Trauma	6	6
Peripartum Hysterectomy	2	1
Inappropriate Surgical / Medical Intervention Morbidity	2	1
Other Medical Morbidity (includes Admission to ICU / DIC / Respiratory Distress etc.)	18	12

Source: MPHSC Database

Appendix

HOSPITAL PERINATAL REVIEW DATA SHEET

Reason for Audit
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 hrs)
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)_____

Name _____

Hospital # (mother) _____

Hospital # (baby) _____

Does Mother have a Treaty Number?
No yes unknown

Mother's Residence _____

Baby Birth date (DD/MM/YYYY)_____

Hospital of Birth (if different):_____

Transfer: From _____ To _____

Sex: male _____ female _____

Birth weight (grams) _____

Maternal Age _____

Mother Birth date (DD/MM/YYY) _____

Gravida _____ Para _____

Gestational Age (on admission)_____

Antenatal Care (Circle appropriate number)
0. none
1. adequate
2. inadequate
3. unknown

Mode of delivery (Circle appropriate number)
1. spontaneous
2. operative vaginal
3. VBAC
4. Caesarean section – primary
5. Caesarean section – repeat
6. assisted breech
7. breech extraction

Single or multiple birth (Circle correct description):
____singleton
____ 1st twin
____ 2nd twin
____ undiagnosed 2nd twin
____other multiple (describe)_____

Apgar score at One minute _____ Five minutes____

Cord Ph – Arterial _____ Umbilical Vein _____

Date of Death (DD/MM/YYYY)_____

Congenital anomaly _____
_____

PERINATAL REVIEW DATA SHEET – Page 2

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

Autopsy (circle) no refused yes **Autopsy Findings**:

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:

BRIEF CASE SUMMARY (legible):

Unresolved Issues:

Maternal and Perinatal Health Standards Committee

Committee Members (2009-2010)

Dr. J. Braun, General Practice
Dr. T. Buchel, General Practice
Ms C. Nykiforuk, Midwife
Dr. D. Peabody, Paediatrician
Ms D. Ridd, Manitoba Health Representative
Dr. N. Riese, General Practice
Dr. C. Schneider, Obstetrician & Gynecologist

Administrative Staff (2009-2010)

Dr. E. Stearns, Obstetrician & Gynecologist, Medical Consultant
Dr. T. Babick, Deputy Registrar, CPSM
Ms N. Dolovich, Administrative Assistant, MPHSC, CPSM
Mr. J. Martin, Administrative Assistant, MPHSC, CPSM

Current Administrative Staff (2013)

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.