

The
Maternal and
Perinatal
Health
Standards
Committee

Annual Report

2005 and 2006



Acknowledgements

The Maternal and Perinatal Health Standards Committee (MPHSC) is pleased to present the twenty-ninth and thirtieth combined Annual Reports for the calendar years 2005 and 2006.

The MPHSC wishes to acknowledge the continuing support of the following organizations. The information they have provided has assisted the committee in its deliberations.

- Manitoba Health Information Systems Branch
- Manitoba Vital Statistics
- Medical Records Departments, Manitoba Hospitals
- First Nations & Inuit Health Branch, Health Canada
- Office of the Chief Medical Examiner
- College of Midwives of Manitoba

The MPHSC acknowledges the interest and cooperation of physicians and health care facilities across the province in providing information for the review process.

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

MPHSC Executive Summary

- ❖ In 2005, the perinatal mortality rate was 8.9 per 1,000 births (>499 grams to 7 days). In 2006, the perinatal mortality rate was 8.3 per 1,000 births. The three-year average was 9.0 per 1,000 births.
- ❖ First Nations women were 1.65 times more likely in 2005 to have a baby die in the perinatal period than other Manitoba women. In 2006 the rate of fetal death for non-First Nations women was found to be 1.36 times more likely to experience Perinatal death than First Nations women. This compares to an equal rate of fetal death between First Nations and Non-First Nations Women in 2004.
- ❖ There were two maternal deaths in 2005 and one maternal death in 2006.
- ❖ In 2005, 154 perinatal deaths were reviewed. Of these, there were 13 cases where a change in medical care might have altered the outcome and at least 8 cases where patient/family issues may have adversely affected the outcome. In 2006, all 165 perinatal deaths were reviewed. Of these, there were at least 3 cases where a change in medical care might have altered the outcome and at least 8 cases where the patient/family may have altered the outcome by a change in their actions.
- ❖ In 2005, 103 cases of neonatal morbidity and 16 cases of maternal morbidity were reviewed. In 2006, 121 cases of neonatal morbidity and 28 cases of maternal morbidity were reviewed.
- ❖ In 2005, there were 5 educational actions taken, and in 2006, there were 2 educational actions taken. Not included are the actions taken at hospital level. When hospitals were able to take action, there was a much quicker turn-around time for resolution of concerns. Also, when reviewing care in the context of their own environment, health care providers were better able to identify what changes could be made and effect change quickly. Preventable features were also identified at the family/patient level. Factors such as poor attendance for prenatal care, substance abuse, and non-compliance with treatment plans had a significant impact on the outcome.
- ❖ During the preparation of data and statistics to complete the 2005 and 2006 Annual Report, the committee continued to review current material and issues.
- ❖ The database classification system and data collection form were reviewed and revised with a focus on streamlining and harmonizing collection methods.

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Definitions

Births, Gestational Age and Birth Weight

Live birth: The complete expulsion or extraction from its 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.

Total Births: All live births and stillbirths (defined under perinatal mortality).

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

Abortion: The complete expulsion or extraction from its mother of a fetus or embryo of less than 20 weeks gestation, whether there is evidence of life or not, and whether the abortion was spontaneous or induced. This usually correlates with a weight of less than 500 grams.

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.

Delayed Neonatal Death: The death of an infant occurring after 28 days of age who, under natural selection circumstances without the benefit of neonatal intensive care, would have died before 28 days of age.

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. For purposes of international comparison, we also give “standard” mortality rates obtained from data on births and deaths of infants weighing 1,000 grams or more. 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).

Corrected Rates: Mortality rates excluding those infants who died from a major congenital anomaly.

Maternal Mortality Rate: The number of maternal deaths that occur as a result of the reproductive process (i.e. direct and indirect maternal deaths) per 10,000 live births.

Three-Year Moving Average: Three-year averages are used to reduce large fluctuations in rates due to small numbers. The rate for each year is calculated by averaging the rate for the year preceding, the year of interest, and the year following.

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.

Introduction

The College of Physicians & Surgeons of Manitoba established the Perinatal and Maternal Welfare Committee (PMWC) in 1977. Renamed the Maternal and Perinatal Health Standards Committee (MPHSC) in 2001, this committee reports to the Central Standards Committee of The College of Physicians & Surgeons of Manitoba. The major function of every standards committee is to maintain and improve quality of care through education. *These educational functions of the College are separate and distinct from its disciplinary functions.*

Educational strategies used by the MPHSC include:

- Sending letters to physicians, hospitals, Regional and Area Standards Committees.
- Publishing articles in the College Newsletter, on the College website, and through Annual Reports that draw members' attention to important aspects of obstetrical and neonatal medical care.
- Participating in development of Statements to enhance obstetrical and neonatal care.
- Advocating for the health of Manitoba women and babies by informing government and other public agencies of recommendations to improve legislation or public policy.

Goals and Objectives

To contribute to the monitoring and improvement of the quality of obstetrical and neonatal care in Manitoba by the following activities:

- **Review:** To collect and review relevant data pertaining to:
 - all stillbirths (>499 grams),
 - neonatal deaths (>499 grams to 28 days of life, inclusive),
 - maternal deaths,
 - specified morbidity in neonates and mothers,
 - other pertinent data which the MPHSC may from time to time determine.
- **Classification:** To determine the factors responsible for all deaths and specified morbidity at family, community and medical care levels.
- **Surveillance:** To maintain a current database for the ongoing monitoring of perinatal, late neonatal and maternal mortality and specified morbidity this will allow for meaningful interpretation.

- **Analysis:** To examine trends in perinatal and maternal mortality and morbidity in the province.
- **Education:** To ensure that education is provided to practitioners and agencies where need has been identified.
- **Recommendation:** To explore policy development related to prevention, and make appropriate recommendations.
- **Publication:** To produce an annual report outlining activities of the committee, data reviewed and recommendations for improvement of outcome, as a public document.

Sources of Information

The MPHSC is notified of all stillbirths, neonatal deaths, and maternal deaths via Manitoba Vital Statistics and Manitoba Health Decision Support Services. Selected morbidities are identified by hospital-based standards committees using International Classification of Diseases, (ICD-9 and ICD-10). Where there are maternal and perinatal standards committees (St. Boniface General Hospital, Health Sciences Centre, Victoria General Hospital (to 2005), and Brandon General Hospital), all mortalities and selected morbidities are reviewed by the hospital committee regarding the quality of care provided in that facility. Cases are referred to the MPHSC when care involved more than one facility and/or is of a nature that requires the expertise of the MPHSC.

Several differences exist in criteria as defined by various agencies for data collection. These differences include:

- Vital Statistics defines a stillbirth by weight and/or gestational age (>499 grams or ≥ 20 weeks), whereas the MPHSC reviews stillbirths by weight only (>499 grams).
- Vital Statistics includes all neonatal deaths regardless of weight and gestational age for rate calculations, whereas the MPHSC includes only those neonatal deaths >499 grams.
- Vital Statistics counts all deaths occurring in Manitoba regardless of the place of birth, whereas the MPHSC records those born out of province separately.
- Manitoba Health reports their figures by fiscal year (1st April to 31st March), whereas data collection by the College, Vital Statistics and most hospital committees is by calendar year.

This results in minor discrepancies between the rates compiled by the above-mentioned agencies and the MPHSC.

Committee Activities

The MPHSC held four meetings in 2005 and four meetings in 2006. They actively reviewed perinatal and maternal mortality and specified neonatal and maternal morbidity. Educational action was taken where appropriate in addition to the development of Newsletter items.

Communication Strategies

Topical issues are communicated to the medical profession through the publication of items in the College Newsletter.

The MPHSC developed three Newsletter items in 2005 and 2006:

- Single Layer vs. Double Layer Closure at Caesarean Section Delivery
- Antibiotic resistant Group B Streptococcus
- Beta Strep Sensitivity

Topics considered by the MPHSC in 2005-2006 are discussed further in this report. Topics for future exploration include maternal deaths, examples of an internal review and audit process, missing electronic fetal strips, readmission following discharge, family at fault, blood glucose monitoring in pregnancy, cervical incompetence & uterine rupture, obese pregnancies, errors in management & poor documentation and referral to the Registrar, College of Physicians & Surgeons of Manitoba as well as other regulatory bodies.

Statistical Summary

In 2005, the MPHSC reviewed 154 cases of perinatal and late neonatal mortality, of which 122 were Manitoba residents, 12 were from out of province who delivered in Manitoba and 20 were of no fixed address. An additional six deaths occurred beyond 28 days of age from conditions arising in the perinatal period. These cases were classified as delayed neonatal deaths and were reviewed by the MPHSC with regard to perinatal care.

In 2006, the MPHSC reviewed 165 cases of perinatal and late neonatal mortality, of which 122 were Manitoba residents and 26 were from out of province who delivered in Manitoba and 17 were of no fixed address.

There were three maternal deaths in 2005 and one maternal death in 2006.

In 2005, 16 cases of maternal morbidity were reported to the committee for review as follows:

- 5 for eclampsia
- 4 because of admission to an Intensive Care Unit
Peripartum hysterectomy (1), Pulmonary edema (1), Other (2)
- 1 for fistula
- 1 for laceration of the uterus
- 1 for peripartum hysterectomy
- 1 was a referral from a physician
- 1 for symphysiotomy bladder damage
- 1 for uterine rupture
- 1 for re-admission

In 2005, 103 cases of perinatal morbidity were reported to the committee for review as follows:

- 59 because of admission to an Intensive Care Unit
 - Seizures (3), birth trauma (2), low apgar (7), other (47)
- 24 for Apgar scores <6 at 5 minutes
- 10 for birth trauma
 - Shoulder dystocia, Erb's Palsy (4), Other (6)
- 5 other cases of morbidity, not requiring ICU admission
 - Other (2), Less than 3rd percentile (2), caesarean or peripartum (1)
- 3 for seizures
- 2 for meconium aspiration with low apgars

In 2006, 28 cases of maternal morbidity were reported to the committee for review as follows:

- 9 for Eclampsia
- 9 for other significant morbidity, not requiring ICU admission
 - Alcohol induced cardiomyopathy (1), caesarean section (1), close to getting needless caesarean section (1), postpartum hemorrhage (1),

pulmonary edema (1), thrombo embolic (1), thrombo embolic with mass transfusion (1), uterine rupture (1), wound dehiscence (1)

- 4 for Caesarean or peripartum hysterectomy
- 3 for Heart failure
- 2 for Cardiomyopathy
- 1 because of admission to an Intensive Care Unit

In 2006, 121 cases of perinatal morbidity were reported to the committee for review as follows:

- 64 because of admission to an Intensive Care Unit
 - Meconium aspiration (2), possible sepsis (2), respiratory difficulty (2), other (58)
- 33 for Apgar scores <6 at 5 minutes
- 10 for birth trauma
 - Erb's Palsy (1), # Humerus (1) Other (8)
- 6 other cases of morbidity, not requiring ICU admission
 - Congenital anomalies (1), eclampsia (1), meconium aspiration (4)
- 5 for seizures
- 3 for meconium aspiration

The following statistical calculations are based on births to Manitoba residents and non-residents who delivered in Manitoba. Prior to 1994, the MPHSC reported statistics based on births to Manitoba residents only. The data is limited to births where the birth weight was 500 grams or greater. In 2005, there were an additional 34 stillbirths and 26 neonatal deaths where the birth weight reported by Manitoba Vital Statistics was <500 grams. In 2006, there were an additional 37 stillbirths and 27 neonatal deaths where the birth weight reported by Manitoba Vital Statistics was <500 grams. These were not included in the review process or in the statistics.

Regional mortality rates are reported using the boundaries of the Manitoba Regional Health Authorities. Three-year moving averages, used in some calculations, eliminate large fluctuations in rates from year to year which sometimes occur when studying small populations. The rate for each year is calculated by averaging the rate for the preceding year, the year of note, and the year following.

This report deals with care provided by physicians only. If concerns are raised regarding care provided by non-physician health care providers, review of that care is referred to the appropriate regulatory body.

Births

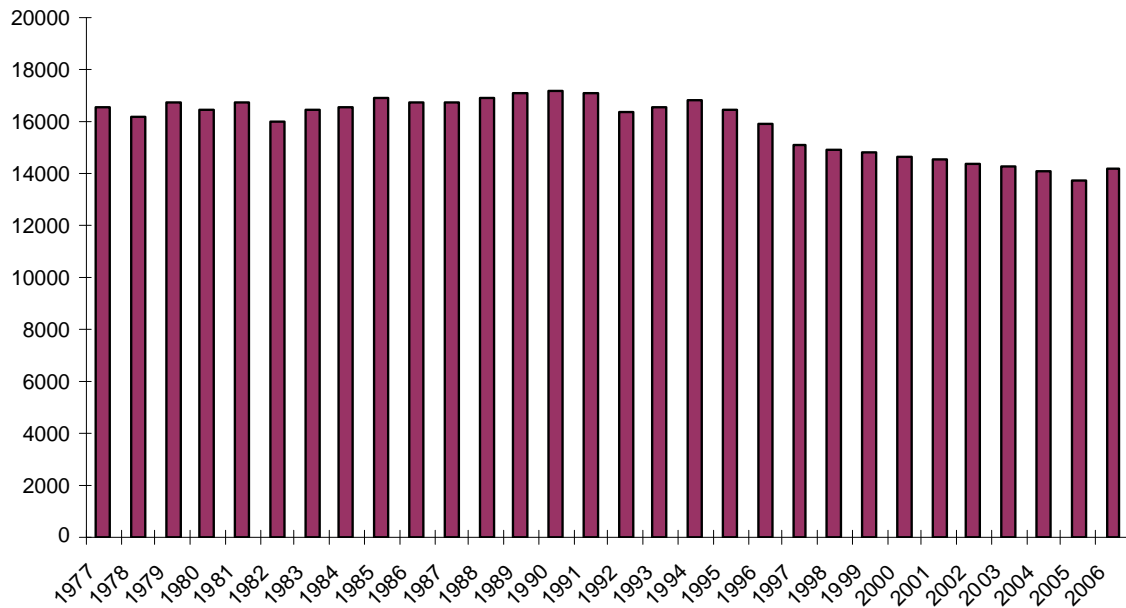


Figure 1 – BIRTHS IN MANITOBA (1977-2006)

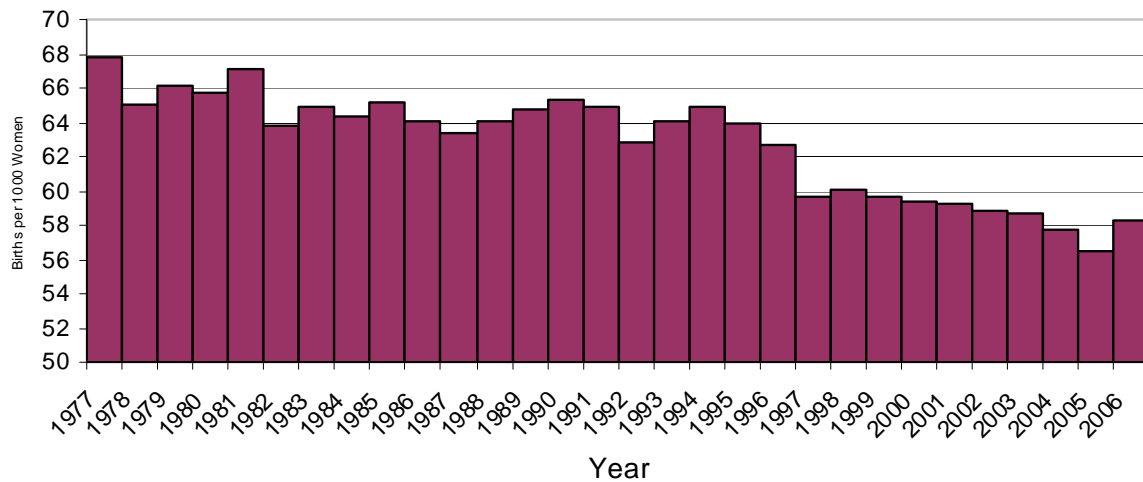


Figure 2 – MANITOBA BIRTH RATE (Births per 1,000 Women)

Note: The denominator for these calculations was the number of women 15 to 44 years of age.

Distribution of Births – Hospital Type

Table 1 – NUMBER OF HOSPITALS BY DELIVERIES PER YEAR FOR 2005/2006			
Number of Deliveries Per Year	Number of Hospitals		
	Level I: Primary Care Centre	Level II: Intermediate Care Centre	Level III: Tertiary Care Centre
1 – 25	15 [♦]	-	-
26 – 50	3	-	-
51 – 100	4	-	-
101 – 500	-	6	-
501 – 1,000	-	2	-
1,001+	-	1	2
TOTAL	22	9	2

[♦] Includes where deliveries occurred at Level 0 Hospitals and Nursing Stations

Canadian Perinatal Mortality

Province/Territory	1999 PMR	2000 PMR	2001 PMR	2002 PMR	2003 PMR	2004 PMR	2005 PMR	2006 PMR
Canada	6.2	6.1	6.3	6.3	6.3	6.2	6.3	6.1
Quebec	5.4	5.5	5.8	5.7	5.2	5.5	5.5	6.8
British Columbia	4.9	4.4	5.5	5.1	5.4	5.2	5.4	2.1
New Brunswick	7.2	5.6	6.0	5.1	4.5	4.4	5.2	5.6
Nova Scotia	4.7	5.7	7.5	5.6	5.7	5.1	6.2	4.7
Alberta	6.7	6.7	6.5	7.3	7.0	7.3	7.1	6.1
Yukon	12.9	8.0	5.8	11.7	6.0	10.9	3.1	6.2
Ontario	6.5	6.7	6.5	6.7	6.7	6.5	6.6	7.4
Manitoba	8.7	7.6	7.8	7.4	9.0	8.6	7.9	6.2
Newfoundland	6.9	5.9	5.7	4.7	6.9	5.6	6.9	6.3
Prince Edward Island	8.5	5.5	9.4	3.0	7.0	6.5	4.5	4.9
Saskatchewan	7.3	7.4	7.5	8.2	7.4	6.8	8.0	5.5
Northwest Territories	14.4	13.3	6.5	12.5	8.5	2.9	4.2	8.7
Nunavut		4.1	11.2	10.9	9.2	12.0	11.4	17.2

Source: Statistics Canada. Table 102-0508 – Perinatal mortality and components, Canada, provinces and territories, annual, CANSIM (database). http://cansim2.statcan.gc.ca/cgi-win/cnsmcgi.exe?Lang-E&CNSM-Fi=CII/CII_1-eng.htm (accessed: August 19, 2009)

The perinatal mortality rate for Manitoba continues to be higher than the Canadian average. This presents a challenge to health care providers, especially in regard to our demographics as well as the presence of a number of at-risk groups, e.g. diabetics in the First Nations population.

Perinatal Mortality – Stillbirths

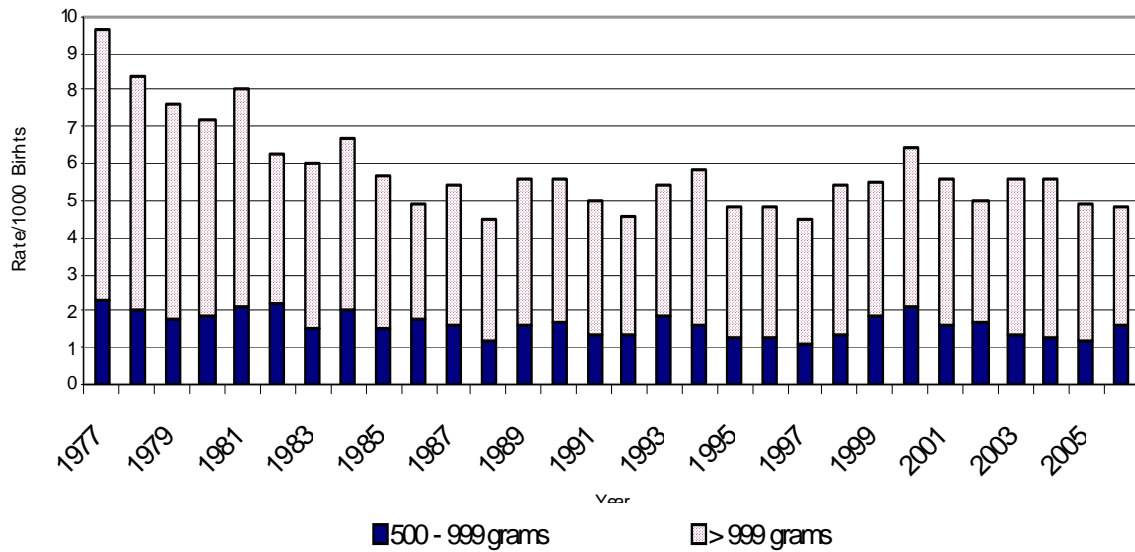


Figure 3 – STILLBIRTH RATES/1,000 BIRTHS BY WEIGHT

Perinatal Mortality – Neonatal Deaths

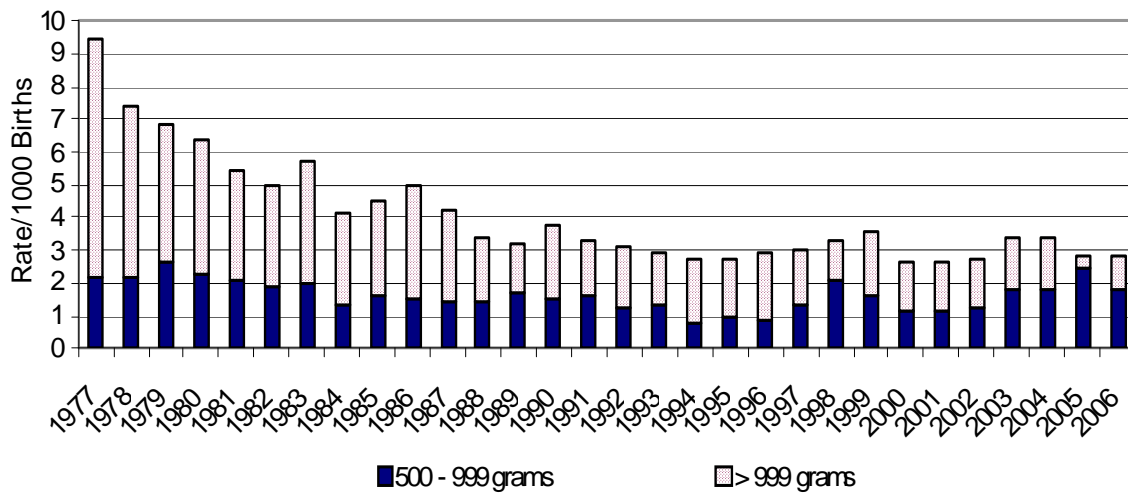


Figure 4 – EARLY NEONATAL DEATH RATES/1,000 BIRTHS BY WEIGHT

Births By Maternal Age

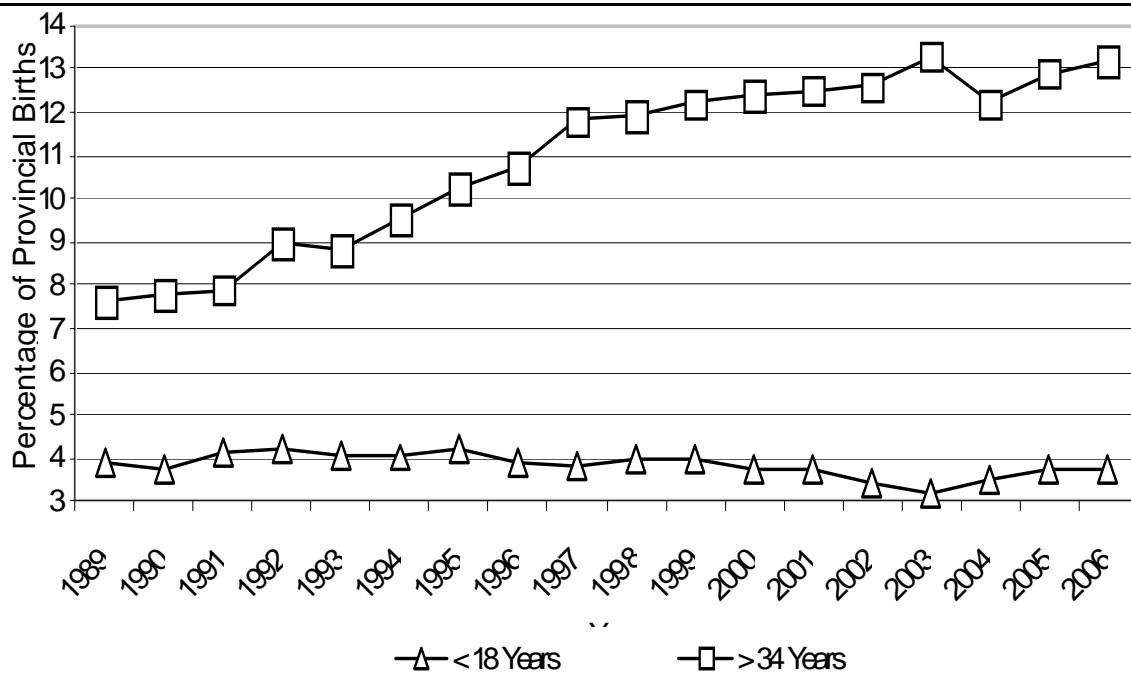


Figure 5 - DISTRIBUTION OF BIRTHS BY MATERNAL AGE

Women who are older continue to contribute an increasing percentage of births. **Figure 5** shows that the percentage of births in Manitoba has increased in women aged 35 years or older in the past decade with 13% of all births in 2005 and 2006 occurring in women aged 35 years or older. It is also notable that the perinatal mortality rate in women aged 40 years or older is significantly higher than the majority of the population.

Perinatal Deaths by Maternal Age

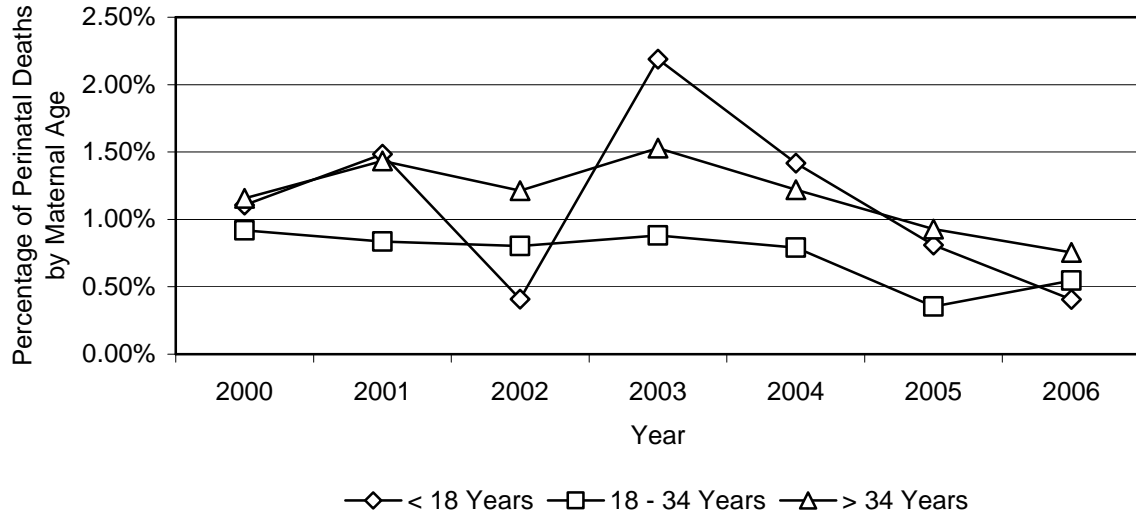


Figure 6 - DISTRIBUTION OF DEATHS BY MATERNAL AGE

TABLE 3 - NUMBER OF PERINATAL DEATHS BY MATERNAL AGE								
	2000	2001	2002	2003	2004	2005	2006	Average
< 18 Years	6	8	2	10	7	4	2	5.6
18 - 34 Years	113	102	97	105	94	42	65	88.2
> 34 Years	21	26	22	29	21	16	13	21.1

Perinatal Mortality – First Nations¹

There were a total of 136 perinatal deaths in Manitoba in 2005, resulting in a perinatal mortality rate of 8.7 per 1,000 births. 2,225 babies were born to First Nations women in 2005. There were nineteen deaths in this population resulting in a rate of 8.5 deaths per 1,000 births. For non-First Nations women, there were 117 perinatal deaths among the 13,501 births, a rate of 8.7 per 1,000 births.

First Nations women were found to be equally as likely to experience a perinatal death as non-First Nations women in 2005. This is slightly lower than the average from the previous three years (2002-2004) of 1.67.

There were a total of 136 perinatal deaths in Manitoba in 2006, resulting in a perinatal mortality rate of 8.3 per 1,000 births. 2,433 babies were born to First Nations women in 2006. There were eighteen deaths in this population resulting in a rate of 7.39 deaths per 1,000 births. For non-First Nations women, there were 118 perinatal deaths among the 13,954 births, a rate of 8.46 per 1,000 births.

Non-First Nations women were found to be 1.14 times more likely to experience a perinatal death than First Nations women in 2006. This is the lower than the average from the previous three years (2003-2005) of 1.49.

The Maternal and Perinatal Health Standards Committee and the Child Health Standards Committee identified some factors associated with higher perinatal mortality among this population, many of which are related to socio-economic conditions and jurisdictionally and geographically limited access to appropriate health care services.

¹ Defined as an individual who is registered under *The Indian Act of Canada*.

Causes of Death

In 2005, there were 94 stillbirths, 54 early neonatal deaths, and 11 late neonatal deaths. In 2006, there were 119 stillbirths, 51 early neonatal deaths, and 7 late neonatal deaths. The causes of death were as follows:

In 2005, 50% (47/94) of all stillbirths were unexplained and 16% (15/94) were due to congenital malformation. Prematurity accounted for 57% (28/49) of neonatal deaths and 24% (12/49) were secondary to congenital malformation.

In 2006, 62% (74/119) of all stillbirths were unexplained and 13% (16/119) were due to congenital malformation. Congenital malformation accounted for 11% (11/96) of neonatal deaths and 30% (29/96) were secondary to prematurity.

In 2005, the overall autopsy rate was 44% (30% for stillbirths and 43% for neonatal deaths). Twenty percent of unexplained stillbirths had autopsies performed. In 2006, the overall autopsy rate was 21% (13% for stillbirths and 30% for neonatal deaths). Twenty four percent of unexplained stillbirths had autopsies performed. It is anticipated that autopsies performed in the remaining cases may have resulted in a better understanding of the causes of death.

Maternal Mortality

Table 4 - MATERNAL DEATHS BY FIVE YEAR TRENDS								
Type of Death	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2006	Total
Direct Obstetric*	5	4	4	1	1	1	2	18
Indirect Obstetric*	4	5	2	7	0	1	1	20
Non-Obstetric*	1	2	4 [♦]	2	1	1	0	11
No. of Births*	84,248	82,216	84,402	84,037	77,249	72,019	27,912	512,083

*See definitions on Page 6.

[♦]Two of these were N.W.T. residents whose deaths were registered in Manitoba.

Caesarean Section

In 2005/2006, there was an overall provincial Caesarean section rate of 21.2%, based on the total number of deliveries in Manitoba. This is below the Canadian average which was in 2004 = 25.6, in 2005 = 26.3, and in 2006 = 26.4 per 100 hospital deliveries.*

Thirty-three Manitoba hospitals offered obstetrical services in 2005. Only 17 of these hospitals had the capability to perform Caesarean sections.

Table 5 – PERCENTAGE OF CAESAREAN SECTIONS BY HOSPITAL TYPE						
Type of Hospital	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Level I: (with Surgical Capability)	15.4	18.1	17.1	19.8	20.6	22.1
Level II:	18.3	17.3	17.3	20.6	20.0	21.7
Level III:	19.1	18.7	21.2	19.3	20.6	21.0
Overall Provincial Total	18.2	18.0	18.9	19.9	20.5	21.2

*(Source: CIHI Health Indicator Reports)

Caesarean Section (continued)

Table 6a – REGIONAL CAESAREAN SECTION NUMBERS AND RATES 2005					
RHA	# of Deliveries*	Total # C/S	# Primary C/S (%)	# Repeat C/S (%)	%
Provincial Total	13,754	2,976	1,933 (65)	1043 (34)	21.6
Interlake	235	34	21 (62)	13 (38)	14.5
South Eastman	360	75	50 (67)	25 (33)	20.8
Burntwood	697	93	55 (59)	38 (41)	13.3
Central	1028	235	151 (64)	84 (36)	22.9
Assiniboine	126	36	15 (42)	21 (58)	28.6
Winnipeg	9,433	2,035	1,359 (67)	676 (33)	21.6
Parkland	398	84	63 (75)	21 (25)	21.1
Norman	363	82	35 (43)	47 (57)	22.6
Brandon	1,111	302	184 (61)	118 (39)	27.2
North Eastman	No Caesarean section capability				
Churchill	No Caesarean section capability				

* Number of deliveries >499 grams reported by Manitoba Health for 2005, at hospitals with Caesarean section capabilities.

Table 6b – REGIONAL CAESAREAN SECTION NUMBERS AND RATES 2006					
RHA	# of Deliveries*	Total # C/S	# Primary C/S (%)	# Repeat C/S (%)	%
Provincial Total	14,158	2,917	1,905 (65)	1,012 (35)	20.6
Interlake	215	20	3 (15)	17 (85)	9.3
South Eastman	379	75	41 (55)	34 (45)	19.8
Burntwood	730	115	71 (62)	44 (38)	15.8
Central	1054	210	125 (60)	85 (40)	19.9
Assiniboine	98	25	13 (52)	12 (48)	25.5
Winnipeg	9,707	1,977	1,330 (67)	647 (33)	20.4
Parkland	379	89	61 (69)	28 (31)	23.5
Norman	327	49	53 (63)	31 (37)	15.0
Brandon	1,227	322	208 (65)	114 (35)	26.2
North Eastman	No Caesarean section capability				
Churchill	No Caesarean section capability				

* Number of deliveries >499 grams reported by Manitoba Health for 2006, at hospitals with Caesarean section capabilities.

There are marked variations in Caesarean section rates between regions. Some of these differences may be accounted for by out-of-province patients delivering in a particular centre, referral patterns within the province, reluctance to leave a remote community for trial of labour, and lack of facility resources/staffing appropriate to conduct a trial of labour. The MPHSC is conducting a long-term review of indications for Caesarean Section to evaluate practice patterns between regions and over time.

Educational Action

There is an improvement in overall perinatal mortality rates over the past 20 years in Manitoba. During case reviews, factors were identified which may decrease both mortality and morbidity if interventions had occurred. The focus of the MPHSC is to reduce preventable mortality and morbidity through a multifaceted approach. This approach includes better prenatal care, educational programs (e.g. improving nutrition, smoking cessation), improved technology (e.g. ultrasound, fetal monitoring), and advances in prenatal care.

Educational actions were taken by the MPHSC in 5 cases in 2005. In 2006, there were 2 educational actions taken. Also there were two referrals made to the Registrar, College of Physicians & Surgeons during 2005 and 2006. Where necessary, other regulatory bodies were informed of situations so that they could take actions. As well, the Chairs of Standards Committees and appropriate individuals in the regional health authorities, and government including Manitoba Health, have been apprised of our concerns.

Summaries, Comments & Recommendations

The following cases are presented to illustrate some of the issues, or concerns dealt with by the Maternal and Perinatal Health Standards Committee. In all the following cases appropriate action has been taken. Some examples of actions consist of educational letters, changes in protocols, direct conversation with involved parties, audits of identified problems, or presentations at rounds in order to improve the care of Manitobans. These cases are not inclusive of all the issues dealt with by the committee but are representative of some of the committee's work.

Maternal Deaths

1.1 This is a case of a 31 year old G7P6 at 30 weeks gestation with no prenatal care who awoke with abdominal pain. She was taken to the hospital via ambulance and en-route she became unresponsive, flaccid, had shallow breathing, dilated pupils, cool/clammy skin, no blood pressure and bradycardic. There was no response to resuscitation efforts. She underwent surgery in an attempt to save the infant. The infant was found in an intact sac in the abdomen along with a large amount of blood clot. There were no signs of life in the infant. There was a history of a classical caesarean section in 2004 for transverse lie and cord presentation and five normal vaginal deliveries at term prior to the caesarean section. Cause of death at autopsy was exsanguination due to a ruptured gravid uterus. This case was classified as nonpreventable and unavoidable.

1.2 A G9 P8 34 year old woman and her partner were travelling from Ontario to BC when she began to experience bleeding and cramping in North Western Ontario. The couple's other seven children had, at some time, been removed from their care by CFS. It is believed they were trying to avoid another apprehension by moving to another province for the birth of their child. While at a truck stop in Central Manitoba a bystander noted the mother's distress and called an ambulance. The mother arrested approximately two minutes from the hospital and underwent an emergency c-section upon arrival. Both the mother and the baby failed to respond to resuscitative efforts. The ambulance bypassed a closer hospital in order to reach a maternity hospital, however this resulted in a delay of only a few minutes and was felt to have had no direct effect on the outcome. It did however result in a review of protocol's relating to ambulance diversions to the nearest hospital with unstable patients.

1.3 A 40 year old G2 P1 at 24 weeks was admitted in septic shock to an urban hospital. Despite vigorous resuscitative efforts, including a caesarean section to empty the uterus, the patient succumbed. Autopsy showed over-whelming pneumococcal pneumonia. This patient was known to have splenic atrophy and serological abnormalities suggestive of but not diagnostic of lupus erythematosus (a collagen vascular disorder).

This case resulted in a review of vaccination protocols for asplenic patients and a publication of a newsletter item with recommendations made.

Example of an internal review and an audit process

- 2.1** An infant weighing 3170 grams was born in a rural hospital through meconium stained amniotic fluid and subsequently developed respiratory distress. Chest x-rays showed a spontaneous pneumothorax. The baby was transferred to an urban NICU (Neonatal Intensive Care Unit) where the baby initially did well on 100% oxygen and intravenous fluids. The infant's condition deteriorated suddenly and a chest tube was placed and the pneumothorax reduced. The baby subsequently died.

An internal review was done as part of ongoing standards processes at the hospital. The review suggested that there was a delay in the intubation of the infant and in calling the on-call neonatologist. A question was also raised as to whether the HMO was fatigued after having been on call for several nights and as a result of this review a number of recommendations were implemented. Some of these recommendations included a need for better charting, a new resuscitation record for patients in the NICU and a better notification process. An educational process was undertaken with the nursing staff involved and recommendations were made to limit the number of hours that an HMO can work in one particular stretch.

This unfortunate case clearly illustrates how the standards process, when properly carried out as mandated can result in important, significant changes to improve the quality of care.

Missing electronic fetal monitoring strips

- 3.1** A 20 year old G1 P0 patient was admitted to hospital at term with a diastolic pressure of 92 and proteinuria. She subsequently had a spontaneous rupture of membranes and underwent augmentation of labour. During the augmentation, decelerations were noted at the time of the placement of the epidural anesthetic after which she subsequently became fully dilated and a kiwi vacuum was applied to deliver the baby. The baby was born on the third percentile, and suffered from hypoglycemia and therefore was transferred to the intensive care unit.

The electronic fetal heart monitor strips from this case could not be located and therefore the case could not be reviewed and as such was classified as unclassifiable.

- 3.2** A 33 year old G1 P0 patient was admitted at 41 weeks gestation in active labour. She delivered a 3.4 kilo baby with Apgars of 5 at 1 minute and 9 at 5 minutes. There was fetal bradycardia at 5cms dilation and an emergency caesarean section

was performed. The cord pH at birth was 7.09 and the baby required admission to NICU for two days.

This case could not be reviewed further as the electronic fetal monitor strip could not be located.

Recommendation: The lack of availability of electronic fetal monitoring strips is a chronic problem even though the appropriate parties have been notified on numerous occasions in regards to this problem. These missing recordings compromise the rights and protections afforded to patients and physicians as well as compromising the standards review process. Modern equipment and proper storage should ensure the long term availability of electronic fetal monitor strips. The committee continues to pursue this issue with regional health authorities.

Re-admission following discharge

- 4.1 This is a case where an infant was re-admitted 13 days after discharge because of increasing jaundice. This infant was born to a G2 P1 Rh+ mother following a normal, spontaneous vaginal delivery. The mother's previous baby had been mildly jaundice but did not require phototherapy. There was no family history of jaundice or of hemolytic disease. The baby appeared to be jaundiced after three days of life and was being fed mainly breast milk. A supplement was started on the day prior to re-admission. The baby was feeding well. On admission the baby's bilirubin was 435 units with a direct of 15. As such the baby was treated by double phototherapy and IV fluids. Four days later upon discharge, the baby's bilirubin was 229 and the baby's condition was good. Diagnosis was prolonged physiologic jaundice. Review of this case showed delays in ordering of the bilirubin test and acting upon the results of the test.

This case, along with several others where re-admission occurred, resulted in a review by the WRHA on the re-admission of newborn infants. The results of the review were re-assuring. No common factors were found and the reasons for re-admission were unique in each instance.

Family at fault

- 5.1 A 21 year old G2 P1 patient with known Type II diabetes presented at 36 weeks gestation with no fetal movement. Intrauterine Fetal Death was subsequently confirmed. The mother was induced and delivered a 4265 grams baby. The mother had eight prenatal appointments with her physician and with her endocrine specialist. She was on insulin and still had a hemoglobin A1C of 10.5. She had fetal assessments performed twice per week with her last fetal assessment 15 days prior to delivery. She was booked for an amniocentesis but did not show up for

that appointment. This case was felt to be theoretically preventable at the family level.

- 5.2** This is a case of a 23 year old G6 P5 patient who had absolutely no prenatal care. It was also noted that she had had no prenatal care in each of her other pregnancies as well. She was known to have Type II diabetes and was on insulin but was totally non-compliant with her therapy. She had one previous caesarean section as well as four vaginal deliveries. She was also a known user of crack cocaine, marijuana and alcohol. She presented in triage with bleeding at 33 weeks gestation and was found to be 3 to 4 cm dilated. The fetal heart was absent and her blood sugars ranged between 11 and 18 during her course in the hospital. The baby weighed 3103 grams at birth. This case was classified as preventable at the level of the family or patient.
- 5.3** A 20 year old G3 P1 presented at 39 weeks gestation and had a spontaneous vaginal delivery. The baby weighed 2505 grams at birth with Apgars of 8 at 1 minute and 9 at 5 minutes. The mother was known to abuse ethanol, marijuana and had used cocaine the evening prior to delivery. The baby was admitted to NICU for observation with mild respiratory distress and had an x-ray suggestive of a pneumomediastinum. Fortunately there was no evidence of withdrawal symptoms in the infant and the baby was discharged three days later into the custody of CFS.

Patients continue to make bad choices both for themselves and their infants despite the efforts and availability of many supports. The College continues to support and applaud the efforts of health care workers who reach out and try to help these individuals. The College also continues to support the many programs currently available to patients.

Blood glucose monitoring in pregnancy

- 6.1** A 29 year old G3 P1 patient presented to a rural hospital at 38 weeks gestation with a history of decreased fetal movement. A fetal heart rate could not be auscultated; therefore the mother was transferred to a tertiary care hospital where fetal demise was confirmed. Labour was induced and the baby had a birth weight of 3850 grams. The delivery was complicated by a postpartum hemorrhage. A review of her record showed that a non-standard approach to glucose screening was done. The chart showed a 50gram screening test was done at 16 weeks gestation with a normal result (6.7) but there is no record of screening being repeated at the usual time (24-28 weeks gestation). Random blood sugars of 10.8, 8.7, and 13.9 were reported in the third trimester. This is suggestive of glucose intolerance. The Glycosylated Hemoglobin A1c concentration at delivery was above the upper range of normal but this is of limited utility in pregnancy. The committee felt that substandard management of glucose intolerance may have contributed to the fetal demise.

- 6.2** This is a case of a G5 P1 mother that was reviewed because of trauma at birth. Ten days prior to birth an ultrasound showed an estimated fetal weight of 4.7 kilo. Labour was induced 13 days past the expected date of confinement. At delivery a shoulder dystocia was encountered requiring the delivery of the posterior arm. The baby weighed 5349 grams at birth and had Apgars of 7 at 1 and 8 at 5 with a cord pH of 7.25. The baby had an Erb's palsy following delivery. The prenatal records showed random blood glucose of 7.4 but no formal diabetes screen had been undertaken. The committee could find no fault with the management of the shoulder dystocia, however the glucose screening in this pregnancy was felt to be far from adequate.

Comments: In both cases educational actions were undertaken by the committee. Ideally the glucose status of women should be known from the point of pre-conception and all throughout the pregnancy. The implications of abnormal glucose control should be appreciated because of the potential effects it can have later in life. Health care workers are referred to the Canadian Journal of Diabetes 2008 Clinical Practice Guidelines for recommendations regarding appropriate glucose screening and monitoring throughout pregnancy. Unfortunately we continue to observe the effects of inadequate monitoring and treatment.

Cervical incompetence & uterine rupture

- 7.1** A 36 year old G6 P2 woman had a previous term delivery in Europe after cervical cerclage. She had previously experienced two first trimester losses and one second trimester loss but because her history was not classic for an incompetent cervix it was elected to follow her cervical length with ultrasound. She was seen in her second trimester every two weeks and was found to have a normal cervical length. At approximately 21 weeks gestation the cervix was noted to be dilated with the membranes reaching the upper vagina. The patient underwent an emergency cervical cerclage during which the membranes ruptured and the patient delivered 10 days later at 22 weeks gestation. Following a review of this case it was felt that the outcome might have been better if the cerclage had been placed earlier. However the chosen course of action was justifiable and appropriate given the patients history. Rupture of membranes is a recognized complication of emergent cervical cerclage.
- 7.2** A 31 year old G1 P0 patient was seen at 40 weeks gestation in early labour. The patient required augmentation with artificially ruptured membranes and syntocinon. She reached full dilatation and pushed for 1.5 hours. At that point the fetal heart rate tracing became non-reassuring and it was decided to proceed with a caesarean section. Upon entering the operating theatre a fetal bradycardia was noted and a general anaesthetic was induced. Upon the opening of the abdomen, free blood was noted in the abdominal cavity, associated with uterine rupture. The baby was delivered with Apgars of 2 at 1 minute, 4 at 5 minutes, 6 at 10 minutes and 7 at 15 minutes with a birth weight of 4310 grams. Although initially

demonstrating signs and symptoms of ischemic encephalopathy at the time of discharge the baby had a normal EEG and MRI. The mother received a transfusion and her uterus was saved with the rupture being repaired. This case was reviewed by the committee and felt to be unavoidable.

Recommendations: Health Care Professionals must always be aware of the potential for cervical incompetence and uterine rupture even in an unscarred uterus but in particular with the use of syntocinon.

Obese pregnancies

Bariatric patients are becoming more and more common and they present with significant risks before, during and after pregnancy. Twenty-one percent of pregnant women were classified as overweight, 13.6% classified as obese in a recent survey by the Public Health Agency of Canada. This agrees with a recent audit by Dr. C. Barson for the WRHA in which maternal and fetal complications were documented. Diabetes, hypertension, macrosomia complicated labours, equipment, resource issues and increased surgical complications are a few examples of risk issues associated with bariatric patients.

- 8.1** A 19 year old G1 P0 with a BMI of 45 was admitted at 38 weeks gestation in spontaneous labour. She was 9 cm dilated upon admission with a second stage of labour that lasted 3 hours and 40 minutes. Severe shoulder dystocia was encountered with appropriate manoeuvres being undertaken. The baby weighed 4540 grams with Apgars of 8 at 1 minute and 9 at 5 minutes and developed a right sided Erb's palsy.

Errors in management, judgment and poor documentation

- 9.1** A 28 year old G4 P0 with a known twin pregnancy presented at 30 weeks gestation with painless vaginal bleeding. Initially both fetuses had normal reactive heart rates and demonstrated normal activity upon ultrasound examination. The bleeding initially settled but then increased and upon reassessment Twin A had a normal heart rate with appropriate variability and accelerations; however, there was difficulty in recording Twin B's heart rate with periods of more than 30 minutes where there was no recording at all. The recorded segments demonstrated decreased fetal heart rate variability with no accelerations. After a further delay, an ultrasound was performed which demonstrated a clot beneath the placenta of Twin B and immediate delivery was recommended with a Caesarean section being performed. Twin B had Apgars of 0 at 1 minute and 0 at 5 minutes with an arterial cord pH of 6.7. Resuscitation was unsuccessful.

Although the diagnosis of placental abruption is often difficult to make both clinically and sonographically, and there is an understandable reluctance to deliver

an immature fetus without a proven indication, the committee felt that there were excessive delays in doing further testing in light of the non-reassuring tracing. This delay most likely contributed to the subsequent still birth.

- 9.2** A 37 year old G1 P1 presented at 41+ weeks gestation having been booked for induction of labour. She had noted decreased fetal movement since the night previous and the fetal heart rate was non-reassuring. Despite this she received Prostin at noon hour and after an hour of further monitoring she was allowed to have a break for lunch. Her attending physician was involved in surgery and so there was a further delay in evaluating the tracing. Once the attending did see the tracing a decision was made to proceed with an emergent caesarean section. The baby was delivered in a compromised condition with an arterial ph of 6.6. The baby was managed in NICU and at the time of discharge was noted to have signs of CNS dysfunction with increased tone and feeding difficulties. The committee expressed concerns about the initial assessment, the decision to proceed with the induction with a non-reassuring tracing and, especially, the delays in responding to the patient's tracing.

Comments: It is inappropriate to undertake an induction of labour without detailed assessment in a patient who has a non-reassuring tracing. Undertaking a method utilizing syntocinon as opposed to a relatively un-stoppable agent such as Prostin should seriously be considered. Close monitoring and the ability to respond quickly to a threatening clinical situation are paramount when inductions are performed.

- 9.3** A 17 year old primip presented with spontaneous rupture of membranes at 41 weeks of gestation. A syntocinon augmentation occurred during the labour and the baby was noted to be in an occiput posterior position. The patient was obese and had an epidural anaesthetic. The second stage of labour lasted for 6.5 hours after which a forceps application was used to deliver the baby. Forceps application delivery occurred over a 40 minute period. The baby sustained a cephalohematoma and was treated for severe jaundice with phototherapy.

It was noted that the forceps application was unduly long and the nursing notes failed to show any documentation of the dosage of Oxytocin in the second stage of labour. The physician responded to the letter of education stating that the prolonged application of forceps was a result of poor uterine contractions despite stimulation with Oxytocin, they had delivered the head to the perineum by forceps and it was considered inappropriate to abandon the forceps in favour of caesarean section. This point was appreciated by the committee. Nursing management was subsequently involved because of the poor documentation and corrective measures were instituted within the unit.

Referral to the registrar, College of Physicians & Surgeons of Manitoba and other regulatory bodies

It is rare that more than educational action is required to alter the practice of physicians. Recently unacceptable trauma to newborns was noted in the practice of one physician. An assessment process was undertaken following audits of charts and educational letters to the physician. When the physician became non-compliant with the assessment process the party was then referred to the College's registrar for appropriate action.

Maternal and Perinatal Health Standards Committee

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