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Maternal Near Miss (Severe Morbidity) at Sisaket Hospital

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ABSTRACT

Objective: To study the incidence of maternal near miss cases (severe morbidity), their near miss events and obstetric outcomes at Sisaket Hospital.

Materials and Methods: This prospective cross-sectional study was conducted between October 1st, 2010 and September 30th, 2011. We recriuted all women over 28 weeks of gestation who gave birth, all deaths of pregnant women and fetuses during pregnancy, childbirth or within seven days of termination of pregnancy and all maternal near miss cases. The maternal and neonatal data were obtained from medical records. Data were analyzed and presented as odds ratio with 95% confidence intervals.

Results: Sample were 4,503 deliveries with 260 near miss cases and 288 near miss events which no maternal death occurred. The incidence of maternal near miss cases was 57.7 per 1,000 deliveries. Pregnancy - induced hypertension was the most common near miss event (34.3 per 1,000 deliveries). Multiparity, gestational age < 38 weeks and without true labor were significantly increased in the near miss cases. Cesarean delivery, birth weight between 1,500-2,499 grams, Apgar score at 5 minutes < 7, admission to NICU were the more common obstetric outcomes in the near miss cases comparing with the non near miss cases.

Conclusion: The incidence of maternal near miss cases was 57.7 per 1,000 deliveries. Pregnancy - induced hypertension was the most common near miss event (34.3 per 1,000 deliveries).

Keywords: maternal near miss, severe morbidity

Introduction

Pregnancy-related deaths in the United States (US) are uncommon. The maternal mortality rate was 6.5 per 100,000 births[1]. Some women die from early pregnancy complications such as ectopic pregnancy, miscarriage, and induced abortion. Others passed away from late complications such as hypertensive disorders, hemorrhage and infections[2]. At Sisaket Hospital, northeastern Thailand, the maternal mortality rate per 100,000 births increases from 23.42 in 2008 to 23.87 per 100,000 births in 2010. The target of the Ministry of Public Health of Thailand is currently at 18 per 100,000 births).

The concept of "near miss" maternal mortality led to the development of statistical systems that can measure indicators of severe maternal morbidities. The maternal near miss is recently defined by the World Health Organization (WHO)[3] as a women who nearly died but survived from complications that occurred during pregnancy, childbirth or within 7 days of

termination of pregnancy. The practical implementation of the maternal near miss concept should provide an important contribution to improve quality of obstetric care and to reduce maternal deaths as well as to improve maternal health. In developed countries, severe maternal morbidities is approximately 5 to 8 per 1000 deliveries. A similar study was recently reported in US with a rate of 8.1 per 1000 deliveries in 2004-2005[4]. Report from Canada showed that an overall severe morbidity rate of 4.6 per 1000 deliveries[5] whilein Netherlands, overall incidence of severe morbidity is 7.1 per 1000 deliveries[6].

The objective of this study was to examine the incidence of maternal near miss cases (severe morbidity), their near miss events and obstetric outcomes at Sisaket Hospital.

Materials and methods

This prospective cross-sectional study was conducted between October 1st, 2010 to September 30th, 2011 at Sisaket Hospital, Thailand. We recruited all women over 28 weeks of gestation who gave birth, all deaths of women and fetus during pregnancy, childbirth or within 7 days of termination of pregnancy and all maternal near miss cases. The fundamental activity was the collection of maternal and neonatal data from medical records, of all eligible women. The data included arrival to discharge time up to the seventh postpartum day. Women came to the hospital after the seventh postpartum day were excluded. We used the information available in the database to establish the predictive value of factors with respect to maternal death during pregnancy, childbirth and first week postpartum. The factors were antepartum hemorrhage, postpartum hemorrhage, pregnancy-induced hypertension, hysterectomy and medical complications.

We also examined the maternal characteristics and between maternal near miss cases and non near miss cases such as maternal age, marital status, parity, number of antenatal visits, cesarean delivery in previous pregnancy, gestational age and onset of labor. Obstetric outcomes such as mode of delivery, birth weight, Apgar score at 5 minutes, neonatal conditions, admission to ICU and newborn status at seventh days were also collected.

In 2009, WHO criteria for maternal near miss were defined as women who nearly died but survived a complication and also included the presented of any life-threatening condition that occurred during pregnancy, childbirth or within 7 days of termination of pregnancy. The latter defined near miss based on organ dysfunction that a set of organ dysfunction maker including: 1.) basic laboratory tests, 2.) management–related markers, and clinical criteria based on the clinical assessment where laboratory and other techniques are not available. The WHO maternal near miss identification criteria was shown in Table 1[3].

Near miss events were defined as acute obstetric complications that immediately threaten a women's survival but do not result in her death either by chance or because of hospital care she receives during pregnancy, labor or within 6 weeks after termination of pregnancy or delivery while a near miss case was a women with at least one near miss event. For identifying the near miss events, we applied the disease-specific criteria that were employed by Filippi et al.[7], included: 1.) hemorrhage leading to shock, emergency hysterectomy, coagulation defects and/or blood transfusion of ≥ 2 litres, 2.) hypertensive disorder in pregnancy, including both eclampsia and severe preeclampsia with clinical/laboratory indications for termination of pregnancy to save the women, life, 3.) dystocia; uterine rupture and impending rupture, e.g., prolonged obstructed labor with previous cesarean section, 4.) infection with hyperthermia or hypothermia or a clear source of infection and clinical signs of septic shock and 5.) severe anemia (hemoglobin level < 7 g/dl) or clinical signs of severe anemia in women without severe hemorrhage.

Table 1. WHO maternal near miss identification criteria or maternal life threatening conditions[3].

Dysfunctional system	Clinical criteria	Laboratory makers	Management based proxies
Cardiovascular	( ) Shock ( ) Cardiac arrest	( ) Severe hypoperfusion (latcate>5mmol/l or 0.45 mg/dL) ( ) Severe acidosis (pH < 7.1)	( ) Use of continuous vasoactive drugs ( ) Cardio-pulmonary resuscitation
Respiratory	( ) Acute cyanosis ( ) Gasping ( ) Severe tachypnea (Respiratory rate >40 bpm) ( ) Severe bradypnea (Respiratory rate<6 bpm)	( ) Severe hypoxemia (oxygen saturation < 90% for ≥ 60 mins. or PaO2/FiO2 < 200)	( ) Intubation and ventilation not related to anesthesia
Renal	( ) Oliguria non responsive to fluid or diuretics	( ) Severe acute azothemia (Cr ≥ 300 umol/l or ≥ 3.5 mg/dL)	( ) Dialysis for acute renal failure
Hematologic/ Coagulation	( ) Failure to form clots	( ) Severe acute thrombocyto penia (< 50,000 plts/ml)	( ) Massive transfusion of blood /red cell(≥ 5 unit)
Hepatic	( ) Juandice in the presence of pre-eclampsia	( ) Severe acute hyperbilirubinemia (bilirubin > 100 mmol/l or > 6 mg/dL)	
Neurologic	( ) Prolonged unconsciousness (lasting > 12 hr) ( ) Stroke ( ) Uncontrollable fit/status epilepticus ( ) Global paralysis		
Alternative severity proxy			( ) Hysterectomy following infection or hemorrhage

Expected outcomes were the incidence of maternal and neonatal complications at Sisaket Hospital. The standardizationfor quality of care in our facilities includes: the mortality rate among women with life-threatening complications provides an overall evaluation of quality of care (low mortality, good quality of care). The proportion of women arriving in the hospital with life-threatening conditions may indicate

the occurrence of delay in the access to care, a comprehensive evaluation of the implementation status of critical life-saving interventions in the continuum of maternal and perinatal care, and contribution to improved health care and reduce morbidity and mortality.

All data were analyzed by using a statistic software package version. By using logistic regression, the odds ratio (OR) and 95% confidence intervals (CI) was calculated assess the association between maternal near miss and maternal not near miss. The current study was approved by the Sisaket Hospital Ethics Committee.

Results

From October 1st, 2010 to September 30th, 2011, 4,458 pregnant women were delivered at Sisaket Hospital, Thailand. There were 4,503 deliveries, 45 twins, 260 near miss cases, 288 near miss events and no maternal death in the study. This current study showed near miss rate of 57.7 per 1,000 deliveries. All near miss events are shown in Table 2. The most common near miss event was pregnancy - induced hypertension (34.3 per 1,000 deliveries).

Characteristics of the near miss and non near miss cases were compared in the Table 3. Characteristics associated with maternal near miss were multiparity (OR 1.39, 95% CI of 1.08-1.81), gestational age less than 38 weeks (OR 2.23, 95% CI of 1.73-2.88) and nonlabor (OR 1.92, 95% CI of 1.24-2.99) (Table 3).

Cesarean delivery, birth weight between 1,500-2,499 grams, Apgar score at 5 minutes < 7, admission to the NICU were the common obstetric outcomes in the near miss cases compared with the non near miss cases (Table 4).

Table 2. Identified near miss events in 260 near miss cases at Sisaket Hospital.

Near miss events	Number (%) (N=288)	Number per 1000 deliveries
- Antepartum hemorrhage	30 (10.4)	6.7
- Preeclampsia	129 (44.7)	28.9
- Chronic hypertension	19 (6.6)	4.3
- Eclampsia	5 (1.7)	1.1
- Gestational diabetes mellitus	63 (21.8)	14.1
- Postpartum hemorrhage	30 (10.4)	6.7
- Hysterectomy	6 (2.1)	1.4
- Uterine rupture	1 (0.4)	0.2
- Chorioamnionitis	2 (0.7)	0.5
- Respiratory complication	1 (0.4)	0.2
- Cardiac complication	1 (0.4)	0.2
- Renal complication	1 (0.4)	0.2

One near miss cases may had more than one near miss event

Table 3. Characteristics of women who experienced maternal near misses.

Characteristic	Near miss (N=260)	Non near miss (N=4,243)	OR (95% CI)
Age in years			
≤ 19	24 (9.23%)	698 (16.45%)	0.30 (0.23-0.43)*
20-34	154 (59.23%)	3,033 (71.48%)	1
≥ 35	82 (31.54%)	512 (12.07%)	0.19 (0.11-0.30)*
Marital status			
Single	6 (2.31%)	147 (3.46%)	0.66 (0.29-1.50)
Married	254 (97.69%)	4,096 (96.54%)	1
Parity			
Primiparous	97 (37.31%)	1,924 (45.35%)	1
Multiparous	163 (62.69%)	2,319 (54.65%)	1.39 (1.08-1.81)*
No. of antenatal visit			
< 4	9 (3.46%)	113 (2.66%)	1.31 (0.66-2.61)
≥ 4	251 (96.54%)	4,130 (97.34%)	1
previous cesarean section			
Yes	22 (8.46%)	481 (11.34%)	0.72 (0.46-1.13)
No	238 (91.54%)	3,762 (88.66%)	1
GA (weeks)			
< 38	120 (46.15%)	1,177 (27.74%)	2.23 (1.73-2.88)*
≥ 38	140 (53.85%)	3,066 (72.26%)	1
Status of labor when admission			
Spontaneous	164 (63.07%)	3,189 (75.16%)	1
Induced	49 (18.85%)	409 (9.64%)	0.75 (0.53-1.07)
No labor and no induced	47 (18.08%)	645 (15.20%)	1.92 (1.24-2.99)*

*Statistical significance ($p < 0.05$)

Discussion

Maternal near miss is defined as the women presentd with potentially fatal complications during antepartum, intrapartum and postpartum but survive by chance or by good hospital care. Maternal near miss cases has also been used to evaluate the quality of obstetric care, leading to improved understanding of cases of maternal death in order to reduce maternal death and to improve maternal health.

The most common near miss events in the present study was pregnancy - induced hypertension (34.3 per 1,000 deliveries). These findings were similar to many previous reports[8-13] that showed the main causes of near miss events were hypertensive disorder, receiving blood transfusion and obstetric hemorrhage. In pregnant women with an obstetric complications or severe maternal morbidity were hypertension and hemorrhage that reflecting the main causes of maternal death. Hemorrhage and infection are prominent causes of death in ectopic pregnancies and abortions, whereas hypertension, embolism, hemorrhage and infection

Table 4. Obstetric outcomes of maternal near miss cases.

Outcome	Near miss (N=260)	Non Near miss (N=4,243)	OR (95% CI)
Mode of delivery			
- Vaginal delivery	122 (46.92%)	2,527 (59.56%)	1
- Cesarean delivery	138 (53.08%)	1,716 (40.44%)	1.67 (1.29-2.14)*
Birth weight (grams)			
<1,500	17 (6.54%)	50 (1.18%)	0.29 (0.16-0.52)*
1,500-2,499	61 (23.46%)	446 (10.51%)	3.56 (1.54-8.24)*
2,500-3,999	168 (64.62%)	3,666 (86.40%)	1
≥ 4,000	14 (5.38%)	81 (1.91%)	0.87 (0.46-1.66)
Apgar score at 5 mins.			
<7	14 (5.38%)	69 (1.63%)	3.44 (1.91-6.20)*
≥7	246 (94.62%)	4,174 (98.31%)	1
Infant gender			
Female	120 (46.15%)	2,052 (48.36%)	0.92 (0.71-1.18)
Male	140 (53.85%)	2,191 (51.64%)	1
Neonatal condition at birth			
Fresh stillbirth	1 (0.38%)	18 (0.42%)	< 0.05*
Macerated stillbirth	0 (0.00%)	23 (0.54%)	< 0.05*
Live birth	259 (99.62%)	4,202 (99.04%)	1
Admission to NICU			
Yes	23 (8.85%)	101 (2.38%)	3.98 (2.48-6.38)*
No	237 (91.15%)	4,142 (97.62%)	1
Newborn status on 7th day			
Dead	5 (1.92%)	35 (0.82%)	2.35 (0.91-6.06)
Alive	255 (98.08%)	4,208 (99.18%)	1

*Statistical significance ($p < 0.05$)

NICU = Newborn intensive care unit

were the leading causes of maternal death in women delivered after midpregnancy.

Maternal characteristics which significantly associated with maternal near miss included multipara, gestational age less than 38 weeks (OR 2.23, 95% CI of 1.73-2.88) and nonlabor (OR 1.92, 95% CI of 1.24-2.99). Our findings were similar to the study from WHO[10]. Antenatal visits 0-3 visits were also found to be associated with the occurrence of near miss and can predict maternal death. However, there was no significant difference between the total number of antenatal visits in our study. Maternal near miss could be used for auditing Sisaket Hospital's facilities where maternal death rarely occured, because near miss cases occur more often than maternal death and may generate more information.

There was reversely significantly correlation between extreme maternal age (≤ 19 and ≥ 35 years)

and the occurrence of near miss cases which contrary to many studies[10,14-15] showed the maternal age more than 34 years old was associated with the occurrence of near miss. Smaller number of those of near miss cases in the extreme maternal age was supposed to be one of the cause of this difference.

It is surprising that labor induction was not associated with the occurrence of a near miss event because usually induction of labor was associated with increased complications such as chorioamnionitis and cesarean delivery compared with spontaneous labor[16].

Our study demonstrated that cesarean delivery had strong correlation with maternal near miss. Cesarean delivery was independently associated with the occurrence of near miss. Cesarean delivery rates increase worldwide[17] and independently associated with increased risk of maternal morbidity and mortality index, including conditions such as blood transfusions from severe postpartum hemorrhage. Cesarean delivery without medical indication was associated with increased risk of maternal morbidity and mortality[18]. Cesarean delivery should be done only when there is a medical indications to improve the outcome of both mother and baby.

Birth weight between 1,500-2,499 grams, Apgar score at 5 minutes < 7, admission to the NICU were the more common obstetric outcomes in the near miss cases compared with the non near miss cases in this study. These findings were similar to the study of WHO[10] showed babies delivered to women who are near misses are smaller, require intensive care more frequently and are at higher risk of dying in the first week of life. In addition, women who are near misses have more stillbirths.

The limitations of this study were, the small number of total delivered cases and the data were collected from the patients records. So the unrecorded information should be neglected as well as those data about near miss events after discharged from the hospital. Some outcomes might therefore have been underestimated, especially for non near miss group delivered vaginally whom usually discharged earlier than the near miss cases.

In conclusion, the incidence of maternal near miss cases was 57.7 per 1,000 deliveries. Pregnancy -induced hypertension was the most common near miss event (34.3 per 1,000 deliveries).

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มารดาเกือบเสียชีวิต (ทุพพลภาพอย่างรุนแรง) ที่โรงพยาบาลศรีสะเกษ

วันชัย เวี่ยนวิเศษ

วัตถุประสงค์ *: เพื่อศึกษาอุบัติการณ์ของมารดาเกือบเสียชีวิต (ทุพพลภาพอย่างรุนแรง) เหตุการณ์การเกือบเสียชีวิต และผลลัพธ์ทางสูติกรรมที่โรงพยาบาลศรีสะเกษ*

วัสดุและวิธีการ *: เป็นการศึกษาเชิงพรรณาแบบภาคตัดขวาง เก็บข้อมูลช่วงระหว่าง 1 ตุลาคม พ.ศ.2553 ถึง 30 กันยายน พ.ศ.2554 กลุ่มที่ทำการศึกษาคือ สตรีที่อายุครรภ์ตั้งแต่ 28 สัปดาห์ ที่มาคลอดสตรีหรือทารก ที่เสียชีวิตระหว่างการตั้งครรภ์ หรือภายใน 7 วัน หลังยุติการตั้งครรภ์ และมารดาที่เกือบเสียชีวิตทุกราย ทำการเก็บข้อมูลมารดาและทารกจากเวชระเบียน นำข้อมูลที่ได้มาวิเคราะห์ทางสถิติโดยใช้ Odds ratio กับช่วงความเชื่อมั่นที่ร้อยละ 95*

ผลการศึกษา *: กลุ่มที่ศึกษามีผู้คลอดทั้งหมด 4,503 ราย โดย 260 ราย เป็นมารดาเกือบเสียชีวิต 288 ราย เป็นเหตุการณ์ที่มารดาเกือบเสียชีวิต ไม่พบมารดาเสียชีวิตจากการคลอด อุบัติการณ์ของมารดาเกือบเสียชีวิต พบได้ 57.7 ต่อ 1,000 การคลอด เหตุการณ์สำคัญที่เกี่ยวเนื่องกับมารดาเกือบเสียชีวิตคือ ความดันโลหิตสูงเนื่องจากการตั้งครรภ์ พบได้ 34.3 ต่อ 1,000 การคลอดมารดาที่เคยคลอดบุตรมาก่อน สตรีที่อายุครรภ์น้อยกว่า 38 สัปดาห์ และการไม่มีภาวะเจ็บครรภ์คลอดเอง มีความสัมพันธ์อย่างมีนัยสำคัญกับการเกือบเสียชีวิตของมารดา การผ่าตัดคลอดบุตร ทารกแรกเกิดมีน้ำหนักระหว่าง 1,500 ถึง 2,499 กรัม คะแนนแอปการ์น้อยกว่า 7 ที่ 5 นาที, การเข้ารับการรักษาในหออภิบาลทารกวิกฤติแรกเกิดเป็นผลลัพธ์ทางสูติกรรมที่พบมากขึ้นในรายที่มารดาเกือบเสียชีวิตเมื่อเทียบกับรายที่ไม่มีการเสียชีวิต*

สรุป *: อุบัติการณ์ของมารดาเกือบเสียชีวิต พบได้ 57.7 ต่อ 1,000 การคลอด เหตุการณ์สำคัญที่เกี่ยวเนื่องกับมารดาเกือบเสียชีวิตคือ ความดันโลหิตสูงเนื่องจากการตั้งครรภ์ พบได้ 34.3 ต่อ 1,000 การคลอด*