Birth Risk Indicators for Maternal and Neonatal Health: Songkla Center Hospital Perspective

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***Objective**: The aim of the present study was to examine the maternal and neonatal birth risk indicator and their relationship with the outcome of pregnancy.*
***Material and Method**: This retrospective descriptive study was conducted in a selective month of 2008, 2009, and 2010. The birth risk indicators of maternal and neonatal health were collected from the medical records.*
***Results**: There were 385, 349 and 334 deliveries in a selective month of 2008, 2009, and 2010. There was neither maternal mortality, nor cardiovascular failure in the present study period. Three main indication of inductions of labor were premature rupture of membrane (up to 4.0%), diabetes mellitus (up to 2.0%), and postdate (up to 1.3%). The first two conditions had statistical significance in September 2009 (p = 0.0334 and 0.0053 respectively). Whereas, the three major indications of cesarean section were previous cesarean section (12.5 to 21.9%), failure to progress due to protracted/arrest of labor pattern with/without rupture of membrane and augmented labor (2.4 to 7.5%), and fetal distress (1.1 to 4.2%). The rates of low birth weight, less than 2,500 grams, were varied from 5.2 to 6.9%. The respiratory distress syndrome (RDS) related to repeat cesarean section was encountered up to 3.6%, as well as the RDS related to induction of labor was up to 1.6%.*
***Conclusion**: The birth risk indicators reflect the outcome of pregnancy, however, the development of additional key indicators for perinatal health care outcome are required.*

***Keywords:** Birth risk indicator, Maternal health, Neonatal health*

J Med Assoc Thai 2012; 95 (2): 147-51
***Full text. e-Journal:** http://www.jmat.mat.or.th*

Maternal and child health care team who provide obstetric services consider the care of women and their families during pregnancy and early childhood one of the most essential and rewarding aspects of practice. The successful outcome requires that the care givers identify and respond in an organized manner to the broad variety of problems that might arise during the time of pregnancy, especially labor and delivery. The burden of mortality and morbidity related to pregnancy and childbirth remains concentrated in developing countries[1,2].

Beside, the maternal and neonatal mortality as the indicators, the maternal and neonatal morbidity either direct and indirect parameter also imply to perinatal health: antepartum, intrapartum and postpartum[3-5]. Many studies are going to achieve consensus on specific indicators in the perinatal health where the uncertainty about appropriate indicators was high. At present, no consensus has emerged around specific definitions for the indicators of maternal support or maternal satisfaction. However, the present study of perinatal health indicators is the essential measurement of quality improvement for maternal and child health care, among the different medical care system of standards and facilities, especially neonatal intensive care[6-8].

The aim of the present study was to examine the maternal and neonatal birth risk indicator and their relationship with the outcome of pregnancy. Ultimately, the authors expect to develop and validate the indicators for measuring major maternal and neonatal morbidity and mortality in maternal and child care.

Material and Method

This retrospective descriptive study was conducted in the Department of Obstetrics and

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Gynecology, Songkla Center Hospital in a selective month of 2008, 2009, and 2010, among pregnant women who were admitted in the labor room for delivery. The birth risk indicators of maternal and neonatal health were collected from the medical records. Data on the maternal and neonatal indirect indicators were elicited from medical records of all deliveries and births, and subsequently analyzed. The study was approved by Ethics Committee of the Faculty of Medicine, Prince of Songkla University.

Demographic data were demonstrated as percentages, median, mean, range and standard deviation. The birth risk indicators were analyzed as cross-tabulation with Chi-squared test and Fisher's exact test as appropriate. Statistical significance was set at < 0.05.

Results

There were 385, 349 and 334 deliveries in September 2008, 2009 and 2010 respectively, and the maternal birth risk indicators are demonstrated in Table 1. There was neither maternal mortality, nor cardiovascular failure in the present study period. The antibiotic usage in the vaginal delivery for at least 24 hours was encountered up to 1.8%. Up to 0.6% had the condition of retained placenta, and the manual

Table 1. Maternal birth risk indicators, comparison of a selective month of three different years

Maternal indicator	September 2008 No. (%), n = 385	September 2009 No. (%), n = 349	September 2010 No. (%), n = 334
Maternal death	0	0	0
Cardiovascular failure	0	0	0
Vaginal delivery and receive antibiotic at least 24 hour	7 (1.8)	6 (1.7)	5 (1.5)
Retained placenta and manual removal	1 (0.3)	0	2 (0.6)
Operative procedure with adjacent organ injury	2 (0.5)	5 (1.4)	0
Blood transfusion	2 (0.5)	1 (0.3)	2 (0.6)
Hematocrit less than 30 volume% before admission	23/309 (7.4)	8 (2.3)* (p = 0.0026)	15 (4.5)
Eclampsia	1 (0.3)	0	0
Baby delivered by obstetrician	223 (57.9)	233 (66.8)* (p = 0.0148)	210 (62.9)
Induction of labor			
Premature rupture of membrane	5 (1.3)	14 (4.0)* (p = 0.0334)	0
Diabetes mellitus	0	7 (2.0)* (p = 0.0053)	1 (0.3)
Postdate (42-week gestation)	5 (1.3)	4 (1.1)	0
Pregnancy induced hypertension	1 (0.3)	3 (0.9)	0
Fetal death in utero	1 (1.3)	0	0
Heart disease	0	0	0
Fetal growth restriction	0	0	0
Chorioamnionitis	0	0	0
Cesarean section due to previous cesarean section	48 (12.5)	75 (21.5)* (p = 0.0015)	73 (21.9)** (p = 0.0009)
Cesarean section due to failure to progress (protracted/arrest of labor pattern, with/without rupture of membrane and augmented labor)	29 (7.5)	17 (4.9)	8 (2.4)* (p = 0.0020)
Cesarean section due to fetal distress	16 (4.2)	4 (1.1)* (p = 0.0126)	4 (1.2)* (p = 0.0211)
Delivered baby weight less than 2,500 gram	20 (5.2)	20 (5.7)	23 (6.9)
Delivered baby with respiratory distress syndrome baby due to repeat cesarean section	11 (2.9)	0* (p = 0.0010)	12 (3.6)
Delivered baby with respiratory distress syndrome baby due to induction of labor	6 (1.6)	0* (p = 0.0317)	0* (p = 0.0330)

* Statistical significance, p < 0.05

** Highly statistical significance, p < 0.001

removal was performed. The operative procedure with adjacent organ injury was up to 1.4%. The blood transfusion was a quite low proportion of 0.3 to 0.6%. The eclampsia was reported up to 0.3%.

The anemic condition, hematocrit less than 30 volume% before admission, was accounted in 2.3 to 7.4%, with significant reduction in September 2009 ($p = 0.0026$). Three main indication of inductions of labor had premature rupture of membrane (up to 4.0%), diabetes mellitus (up to 2.0%), and postdate (up to 1.3%). The first two conditions were statistical significance in September 2009 ($p = 0.0334$ and 0.0053 respectively). Whereas, the three major indications of cesarean section were previous cesarean section (12.5 to 21.9%), failure to progress due to protracted/arrest of labor pattern with/without rupture of membrane and augmented labor (2.4 to 7.5%), and fetal distress (1.1 to 4.2%). The prevalence of cesarean section according to previous cesarean section was significantly increased in September 2009, and 2010 ($p = 0.0015$ and 0.0009). While the cesarean section due to failure to progress and fetal distress were statistically decreased in September 2010, and September 2009 and 2010 respectively ($p = 0.0020$, and $p = 0.0126$ and 0.0211).

The rates of low birth weight, less than 2,500 grams, varied from 5.2 to 6.9%. The respiratory distress syndrome (RDS) related to repeat cesarean section was encountered up to 3.6%, as well as the RDS related to induction of labor was up to 1.6%.

The neonatal birth risk indicators are shown in Table 2. The perinatal death, less than 28 days postpartum, in baby weight 1,000 grams or more, was up to 0.5%, while the still birth in baby weight 1,000 grams or more, was up to 0.8%. The Apgar score at 5 minutes equals 4 or less, was up to 1.6%. The birth complications related to labor and delivery were birth injury of up to 2.1%, and massive aspiration syndrome of up to 4.4%. The statistical significance of both birth complications were reported in September 2009 ($p = 0.0399$, and $p = 0.0001$). Overall, the term newborns required neonatal intensive care were varied from 13.2 to 15.9%.

Discussion

The present study describes the possible birth risk indicators reported in existing medical records. Sixteen maternal indicators and 6 neonatal indicators have been proposed. The authors expected them to be both direct and indirect indicators to reflect the labor and delivery of the newborn. Even though the period of the presentstudy had no maternal mortality and cardiovascular failure, however such rare conditions of avoidable causation will certainly reflect the standard of care of life threatening conditions. Thus the promoting standard for quality of maternal health care relies on access to information, active strategies to facilitate professional behavior change and efforts to sustain the change [9].

The use of antibiotics to prevent infections during pregnancy and the puerperium is clearly different from the use of antibiotics to treat established infections, usually more than 24-hour duration [10]. The antibiotic therapy indirectly implies to infectious morbidity of up to 1.8%, as well as general morbidity of obstetric complications.

The anemic condition before admission was encountered up to 7.4% is similar to 11% of the study

Table 2. Neonatal birth risk indicators, comparison of a selective month of three different years

Neonatal indicator	September 2008 No. (%), n = 385	September 2009 No. (%), n = 349	September 2010 No. (%), n = 334
Perinatal death (less than 28 days postpartum) in baby weight 1,000 grams or more	2 (0.5)	0	0
Still birth in baby weight 1,000 grams or more	3 (0.8)	1 (0.3)	0
Apgar score at 5 minutes equals 4 or less	6 (1.6)	1 (0.3)	0* (p = 0.0330)
Birth injury	8 (2.1)	1 (0.3)* (p = 0.0399)	7 (2.1)
Massive aspiration syndrome	17 (4.4)	0* (p = 0.0001)	6 (1.8)
Need neonatal intensive care unit in term newborn	51 (13.2)	50 (14.3)	53 (15.9)

* Statistical significance, $p < 0.05$

** Highly statistical significance, $p < 0.001$

of Sherard and Newton[11]. The routine hemoglobin and/or hematocrit testing on admission to labor and delivery are necessary, as well as compliance of iron supplement.

The indications of cesarean section in the study are similar to the study of Naidoo and Moodley[12]. The majority of elective cesarean section was done for previous cesarean section, and the emergency cesarean was performed for failure to progress, and fetal distress.

The rates of low birth weight were varied from 5.2 to 6.9%, were slightly lower than national figure of 8.7% in 2006[13]. The frequency of RDS in previous cesarean section was ranged 2.9 to 3.6%, comparable with a large cohort study of 0.8 to 3.7%[14].

Among baby weight 1,000 grams or more, the perinatal death and still birth were up to 0.5% and 0.8%, similar to the four district study of Thailand the perinatal death and still birth were 1.0% and 0.6%[15].

The present study identified and described the strong core set of indicators, reflecting the birth risk of labor and delivery service. The disadvantage of the present study is the data is retrospective study, while prospective study provides more accurate and closely reflects information of pregnant women and their babies. In conclusion, the birth risk indictors reflect the outcome of pregnancy, however the development of additional key indicators for perinatal health care outcome are required.

Acknowledgement

The author would like to express our gratitude to Dr. Nutthaporn Chandeying, Department of Obstetrics and Gynecology, Faculty of Medicine, Prince of Songkla University, for her assistance in statistic analysis, and editing the first draft of manuscript.

Potential conflicts of interest

None.

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ตัวบ่งชี้ความเสี่ยงการคลอดสำหรับสุขภาพมารดาและเด็กแรกเกิด: มุมมองของโรงพยาบาลสงขลา

พีระนันท์ แก้วสุกใส, วีระพล จันทร์ดียิ่ง

วัตถุประสงค์: *ความมุ่งหมายของการศึกษานี้เพื่อตรวจสอบตัวบ่งชี้ความเสี่ยงการคลอดของมารดาและเด็กแรกเกิดและความสัมพันธ์กับผลที่ได้รับของการตั้งครรภ์*

วัสดุและวิธีการ: *การศึกษาแบบพรรณนาย้อนหลังนี้ดำเนินการในเดือนที่เลือกหนึ่งเดือนของปี พ.ศ. 2551, 2552 และ 2553 ด้วยการรวบรวมตัวบ่งชี้ความเสี่ยงการคลอดของสุขภาพมารดาและเด็กแรกเกิดจากเวชระเบียน*

ผลการศึกษา: *มีการคลอด 385, 349 และ 334 ครั้ง ในเดือนที่เลือกหนึ่งเดือนของปี พ.ศ. 2551, 2552 และ 2553 ไม่มีการตายของมารดา และไม่มีภาวะหัวใจหลอดเลือดล้มเหลวในช่วงการศึกษา ตัวบ่งชี้สามลำดับแรกได้แก่ ภาวะถุงน้ำคร่ำแตกก่อนเจ็บครรภ์ (มากถึงร้อยละ 4.0) เบาหวาน (มากถึงร้อยละ 2.0) และ อายุครรภ์หลังกำหนด (มากถึงร้อยละ 1.3) สองภาวะแรกมีความแตกต่างอย่างมีนัยสำคัญในปี พ.ศ. 2552 (ค่า p เท่ากับ 0.0334 และ 0.0053 ส่วนสามตัวบ่งชี้หลักของการผ่าตัดคลอดได้แก่ การผ่าตัดคลอดมากก่อน (ร้อยละ 12.5 ถึง 21.9) ล้มเหลวในความคืบหน้าการคลอดเนื่องจากรูปแบบการเจ็บครรภ์เนิ่นนาน/หยุดนิ่ง (ร้อยละ 2.4 ถึง 7.5) และ ภาวะทารกคับขัน (ร้อยละ 1.1 ถึง 4.2) อัตราการคลอดเด็กแรกเกิดน้ำหนักน้อยกว่า 2,500 กรัม แปรผันตั้งแต่ร้อยละ 5.2 ถึง 6.9 ส่วนกลุ่มอาการหายใจลำบากของเด็กแรกเกิดสัมพันธ์กับการผ่าตัดคลอดซ้ำมากถึงร้อยละ 3.6 ในขณะที่กลุ่มอาการหายใจลำบากของเด็กแรกเกิดสัมพันธ์กับการกระตุ้นเจ็บครรภ์มากถึงร้อยละ 1.6*

สรุป: *ตัวบ่งชี้ความเสี่ยงการคลอดสะท้อนผลที่ได้รับของการตั้งครรภ์ อย่างไรก็ตามต้องการการพัฒนาตัวบ่งชี้อันเป็นกุญแจเพิ่มเติมอีกหลายตัวบ่งชี้เพื่อประเมินผลที่ได้รับในการดูแลสุขภาพปริกำเนิด*