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The Effect of Implementing OB Trauma Activation Standards on Maternal & Fetal Outcomes

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Abstract:

The risk of trauma during pregnancy is not well established in the United States but is associated with significant morbidity and mortality. The overall goal of this study is to to initiate a formal ongoing process by which DHR can utilize objective measures to monitor and evaluate the quality of OB trauma services. We will use a Continuous Quality Improvement (CQI) approach to evaluate the effect of implementing an OB Trauma Activation Procedure, which places an OB team (obstetrician and labor RN) at the bedside within 15 minutes on maternal and fetal outcomes. 1,285 subjects were initially filtered to remove those not fulfilling criteria and we are now in the process of chart reviewing 171 patients. Based on prior studies we expect to find the highest prevalence of traumas due to domestic abuse and motor vehicle accidents. We also expect to find a significant decrease in time to patient evaluation by the OB team.

Introduction:

This quality improvement (QI) project is being conducted because trauma in pregnancy is associated with significant morbidity and mortality. The most common complications include preterm labor/delivery, preterm pre-labor rupture of membranes, placental abruption, fetal-maternal hemorrhage, and rarely, uterine rupture.[1,2] As a result, prompt specialty care is critical with regards to admission assessment and treatment processes that lead to the best maternal and fetal outcomes. Although trauma teams are well equipped to handle the primary survey of women of childbearing age, they are not trained in the specialty care unique to obstetrics. A dual patient challenge, such as that arising during trauma in pregnancy, cannot wait sequentially until maternal stabilization has occurred.

Published study recommendations support simultaneous consultation of obstetric services along with the trauma team to aid in initial evaluation.[3,4] For example, if maternal resuscitation is being undertaken and found to be inadequate due to an enlarged uterus pressing on the inferior vena cava, then the obstetrician is best trained to determine if an immediate cesarean delivery is indicated. This requires ability to quickly estimate gestational age by physical exam, and judgment regarding fetal viability. Additional skills required upon assessment include accurate diagnosis of fetal distress via interpretation of electronic fetal monitoring. One of the most common outcomes of OB trauma, placental abruption, is presumptively diagnosed based on history, physical exam, and findings of uterine irritability and/or frequent uterine contractions which may be associated with non-reassuring fetal heart tones

(i.e. decreased variability and/or late decelerations). These skills require special training and/or certification to effectively apply them to patient care.

The **purpose** of this QI project is to initiate a formal ongoing process by which DHR can utilize objective measures to monitor and evaluate the quality of OB trauma services. The need for research in this area is due in part to the American College of Obstetricians & Gynecologist's (ACOG) reaffirmation of the need for levels of maternal care, advocating that "pregnant women should receive the same level of trauma care as nonpregnant patients," which is contrary to the belief that prompt trauma care of pregnant women should include an OB team within minutes of arrival.[5] Because trauma in pregnancy involves a maternal-fetal dyad, it is necessary to evaluate the impact of multidisciplinary care, combining the best in both trauma and obstetric services. This endeavor requires alignment of policies and procedures within both DHR-Main and DHR-Women's, with a standardized approach to care.[7]

The overall **objective** is to evaluate the effect of implementing an OB Trauma Activation Procedure, which places an OB team (obstetrician and labor RN) at the bedside within 15 minutes on maternal and fetal outcomes.

Materials and Methods:

A Continuous Quality Improvement (CQI) approach will be used to review the DHR policy, *Trauma Team Activation and Notification* which began in 2017, and DHR Standard Operating Procedure, *OB Trauma Activations* which began in 2020. In conjunction with the Director of DHR Labor & Delivery, Antepartum, & Triage (Annabelle Hernandez) and the Trauma Program Director (Dawn Woods), focus will be given to strategies that have been used to improve the existing policy and procedure. After review of the literature, any additional consensus strategies will be proposed and ultimately evaluated if approved.

A time series design will be used to evaluate maternal/fetal outcomes prior to and after initiation of these guidelines. This design will fulfill the intent of the study by showing trends in care and outcomes prior to and after initiation of the OB Trauma directives. Retrospective collection of maternal and fetal data from both DHR-Main and DHR-Women's Hospital will occur from January 1, 2017 through prospective collection ending January 1, 2023. The total number of subjects to be studied will be all those meeting the criteria of pregnancies greater than or equal to 20 weeks gestation who have experienced OB trauma s/p admission to either DHR-Main or DHR-Women's Hospital. The age range of subjects is expected to be 12 to 51 years old, which is consistent with that of childbearing.

Pregnancies greater than 20 weeks complicated by trauma from January 2017 through January 2023 at either DHR-Main or DHR-Women's Hospital in Edinburg Texas will be identified by International Classifications of Diseases, Clinical Modification, 9th/10th ed. (ICD 9/10) codes and records examined via retrospective or prospective review. For example, for years designated with ICD 10 codes, records

that contain a diagnosis code of either Z33.1 (pregnant state, incidental), Z3A (weeks of gestation), 09A.212 (injury complicating pregnancy—second trimester), 09A.213 (injury complicating pregnancy—third trimester), or 09A.219 (injury complicating pregnancy—unspecified trimester) will be searched. A designated representative from the healthcare information technology (HIT) department will identify charts to be reviewed. The source of records to be reviewed will include Cerner, GE Centricity, and DHR Delivery Log.

Discussion:

This QI project is pioneering with little prior information, as the risk of trauma during pregnancy is not well established in the United States. Most report an incidence of 6-8%, but these citations are not supported with evidence-based sources. A systematic review in 2013, however, estimated rates for non-intentional and intentional causes. The most common non-intentional causes are motor vehicle crashes (207/100,000 live births), followed by falls/slips (48.9/100,000 live births), toxic exposure (25.8/100,000 person-years), and burns (0.17/100,000 person-years). Intentional causes include domestic violence (8,307/100,000 live births), penetrating trauma (3.27/100,000 live births), homicide (2.9/100,000 live births) and suicide (2/100,000 live births).[3] With this in mind, we predict our findings will be similar with the most common traumas being domestic violence and motor vehicle crashes.

The only study to date that has addressed the effects of implementing an OB Trauma Activation Procedure was published recently.[3] Using a retrospective cohort analysis comparing 50 patients pre-intervention to 2 patients post-intervention over a 6-year period, these researchers hypothesized that implementing a perinatal emergency response team (PERT) would improve time to patient/fetal evaluation and that monitoring by the OB team would improve both maternal and fetal outcomes.[3] The PERT team consisted of trauma surgeons, emergency medicine physicians and emergency department nurses, obstetricians and obstetrical nurses, radiology technicians, general anesthesiologists, obstetric anesthesiologists, neonatologist, and neonatal respiratory therapists.[3] Results demonstrated a significant decrease in time to patient evaluation by the OB team and in time to electronic fetal monitoring in the pregnant trauma patient.[3] There were no significant differences between cohorts for complications, hospital length of stay, or maternal/fetal mortality.[3]

This QI project intends to add to this foundation by focusing on more cases and additional outcomes. We initially pulled subjects based on ICD codes and began with 1,285 subjects. Then, we filtered through these to remove duplicates and subjects who did not meet inclusion criteria. After that we had 121 patients to chart review. Following that we were able to use a trauma report to find an additional 150 cases. Analyzing a greater number of cases than the previous study, which used 92, improves power. Because data regarding the time of initiation and length of post-trauma electronic fetal monitoring will be collected, it is believed that the length of

hospital stay will be shorter due to the now recommended 4-hour monitoring guideline, an endpoint that has not been investigated before. Additionally, the current study proposes to evaluate the effect of expediting arrival of an OB team, consisting simply of an obstetrician and labor RN. This seems reasonable considering the previous study mobilized an entire PERT term to each trauma activation, taking high-intensity resources away from their specialized units. Finally, diagnostic data that focuses on optimizing the evaluation and management of the mother and her injuries will be collected, thus adding more evidence to what is known about quality metrics.

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