A Prospective Study of the Efficiency of the "Code 333" Process at the Ottawa Hospital

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Abstract

Objective: This study evaluated the efficiency of the "Code 333" process at The Ottawa Hospital (TOH) during obstetric emergencies. A Code 333 is an overhead call made in TOH obstetrics units to activate an emergency response system. The code calls for resuscitative measures on a mother and/or a fetus and expedited delivery of a fetus considered at high risk of demise. Internationally, the recommended maximum time between the decision to deliver and actual delivery of an infant, referred to as decision-to-delivery interval (DDI), is 30 minutes.

Methods: The study was conducted over an 11-month period from February 2007 to January 2008 at The Ottawa Hospital Birthing Units (TOHBU)—Civic and General campuses. Data were collected during the code using validated documentation sheets. The day and time of decision, the indication and outcome of the code, the mode of anaesthesia used, and the condition of the baby at birth were recorded for time interval calculations.

Results: The median DDI for 85 emergency Caesarean sections was 16 minutes. Ninety-eight percent of TOH deliveries were completed within the recommended 30 minutes. Over one third of these deliveries were completed within 15 minutes. Urgent codes had a median DDI of 13 minutes, compared with 20 minutes for less urgent codes. Time of day or day of the week did not have any effect on DDI.

Conclusion: The recommended DDI of 30 minutes was routinely achieved at TOHBU. DDI was prolonged in only 2% of codes during the study period, with no adverse outcome.

Résumé

Objectif : Cette étude a évalué l'efficacité du processus « Code 333 » à L'Hôpital d'Ottawa (L'HO) au cours des urgences obstétricales. Par « Code 333 », on entend un appel à l'interphone effectué au sein des unités d'obstétrique de L'HO en vue d'activer un système d'intervention d'urgence. L'activation de ce code exige la mise en œuvre de mesures de réanimation chez une mère et/ou un fœtus et l'accélération de l'accouchement d'un fœtus considéré comme courant un risque élevé de connaître la mort. Sur le plan international, le délai maximal recommandé entre la décision d'accoucher et l'accouchement réel d'un nouveau-né, connu sous le nom d'intervalle décision-accouchement (IDA), est de 30 minutes.

Méthodes : L'étude a été menée sur une période de 11 mois, soit de février 2007 à janvier 2008, au sein des unités de naissance de L'Hôpital d'Ottawa (UNL'HO) des campus *Civic* et *General*. Les données ont été recueillies au moment de l'activation du code, au moyen de formulaires de documentation validés. Le jour et l'heure de la décision, l'indication et l'issue du code, le mode d'anesthésie utilisé et l'état du nouveau-né à la naissance ont été consignés aux fins du calcul de l'intervalle.

Résultats : L'IDA médian pour ce qui est de 85 césariennes d'urgence était de 16 minutes. Quatre-vingt-dix-huit pour cent des accouchements de L'HO ont été accomplis dans le délai recommandé de 30 minutes. Plus du tiers de ces accouchements ont été accomplis dans un délai de 15 minutes. Les codes urgents comptaient un IDA médian de 13 minutes, par comparaison avec 20 minutes pour ce qui est des codes moins urgents. L'heure ou le jour n'exerçaient aucun effet sur l'IDA.

Conclusion : L'IDA recommandé de 30 minutes a été systématiquement respecté au sein des UNL'HO. L'IDA n'a été prolongé que dans le cadre de 2 % des codes au cours de la période d'étude, sans issue indésirable.

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INTRODUCTION

A "Code 333" is an overhead call made in The Ottawa Hospital obstetrics units to activate an emergency response system. The code is initiated to trigger resuscitative measures in a mother and/or fetus and also to speed up the delivery of a fetus deemed to be at high risk of demise. In these situations, a delay in delivery may potentially increase the risk of maternal or fetal morbidity or mortality. Emergency conditions can include prolonged fetal heart rate deceleration (sudden decrease in the fetal heart rate from baseline to below 80 to 100 beats per minute and lasting more than 2 minutes with no return to baseline within 10 minutes), cord prolapse, placenta abruption, major maternal hemorrhage, and eclampsia.

Caesarean sections performed for these reasons are referred to as "crash" or "emergency" Caesarean sections. Various national consensus panels such as the American College of Obstetricians and Gynecologists,[1] the Royal College of Obstetricians and Gynaecologists,[2] and the Canadian National Consensus Conference on Aspects of Caesarean Birth[3] have recommended that there should be a maximum time interval of 30 minutes between the decision to deliver and actual delivery of the infant. This interval has been defined as the decision-to-delivery interval.

This interval not only has significance for the well-being of the mother and baby, but may also be pivotal in litigation. If negligence by health professionals around the time of birth is alleged, the time taken to deliver the child comes under scrutiny. This time frame is often subject to criticism by medico-legal experts conducting a retrospective review of the sequence of events.[4] Additionally, the development of evidence-based standards to assess clinical performance is now an essential part of providing patient care in a clinical governance model. As a fundamental principle of patient safety, all actions should be geared towards minimizing preventable perinatal harm to the mother and her fetus. Following the Institute of Medicine's quality criteria,[5] management of all cases should be safe, effective, patient-centred, timely, efficient, and equitable.

In 1989, the ACOG Committee on Professional Standards[1] recommended that in carrying out emergency Caesarean sections the DDI should not exceed 30 minutes, and that obstetric units handling high-risk patients should be staffed and equipped to handle emergencies and be able to begin a Caesarean section in 15 minutes. However, this recommendation was based on limited objective evidence. Few studies have been conducted to evaluate how obstetric units have met this standard. The majority of these studies have been carried out in Europe and Australia, and we have little published data on current trends or performance in the United States or Canada. In addition, comparing these studies is difficult, because study definitions of emergency Caesarean section vary. The standard DDI of 30 minutes does not take into account the degree of urgency of the emergency Caesarean section, and in some studies the 30 minute DDI is applied to all non-elective cases. This implies that in dire emergencies, such as the Code 333, the ideal DDI may be much shorter than the current standard of 30 minutes; Sayegh et al.[6] recommended 15 minutes in these circumstances. The designation of "emergency Caesarean section" to encompass all non-elective (unplanned) care has posed significant difficulty in comparing data from different studies. To help standardize this definition, Lucas et al.[7] in the United Kingdom interviewed 60 anaesthesiologists and 30 obstetricians using a 5-point scale to assess close agreement in views. They developed a 4-grade classification which defined an emergency Caesarean section as one performed when there is immediate threat to the life of the woman or fetus. An urgent Caesarean section was defined as one performed for maternal or fetal complications which are not immediately life threatening. In our study, the term "crash" Caesarean section is used synonymously with the definition of emergency Caesarean section used by Lucas et al.[7] Most studies have reported that the 30-minute DDI is difficult to achieve; few have considered the standard to be achievable.[8–12] In a one-year prospective study by MacKenzie and Cooke,[8,9] the median DDI was 35 minutes for crash and urgent Caesarean sections; for crash Caesarean sections alone, the average DDI was 27.4 minutes. In the above studies, an identifiable factor influencing the DDI was the mode of anaesthesia: using general anaesthesia decreased the DDI by 50%.

Considering the great economic and medico-legal consequences for the obstetrics community of successfully adhering to the recommended standards, such adherence will depend on the feasibility of performing all emergency Caesarean sections within 30 minutes. To assess the efficiency of the Code 333 process at TOH, we examined the timing of the sequence of events leading to resuscitative measures and/or delivery of the fetus. The main objective of this study was to identify perceived delays and develop strategies to improve performance during obstetric emergencies. Specifically, the study sought to determine the DDI in Code 333 situations at TOH, evaluate factors influencing this interval and identify the reasons for delays, assess the impact of DDI on immediate neonatal outcomes, and compare performance during emergency Caesarean section scenarios with current recommended standards.

ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists
DDI	decision-to-delivery interval
TOH	The Ottawa Hospital
TOHBU	The Ottawa Hospital Birthing Units

MATERIALS AND METHODS

The study was conducted over an 11-month period from February 2007 to January 2008 at The Ottawa Hospital Birthing Units–Civic and General campuses. Data were collected during the code by the head nurse and the patient's primary nurse. Two study sheets were designed and validated for data collection—Code 333 flow and