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ORIGINAL ARTICLE

Immediate birth – an analysis of women and their babies undergoing time critical birth in a tertiary referral obstetric hospital

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ABSTRACT
Background: At our institution, the emergency obstetric 'code green' activates the system for immediate birth, usually by caesarean section. This study aimed to determine the incidence of immediate birth, indications, modes of anaesthesia, and short-term neonatal and maternal outcomes.
Method: A review was performed for all women at the Royal Women's Hospital, Parkville, Australia who underwent immediate birth over a two-year period: January 1, 2013 to December 31, 2014.
Results: Within the study period 14,115 women gave birth, of which 387 women underwent an immediate birth, the majority (83%) by caesarean section. The commonest indication for immediate birth was for prolonged fetal bradycardia (53%), however cord prolapse (4%) produced the most rapid decision to delivery interval with a median [IQR] time of 14 [13–16] min versus 18 [14–23] min for all immediate births (P <0.01). Epidural top-up was the most common anaesthesia method. Conversion to general anaesthesia following inadequate neuraxial anaesthesia occurred in 6.2% of women. Among 103 general anaesthetics, there was one failed intubation (successful ventilation) and one dental injury. Nine women (2.3%) were admitted to the high dependency or intensive care units, and there were no maternal deaths. Babies born by caesarean section with a decision-to-delivery interval of less than 30 min were more likely to have longer times to establish respiration (22.6% vs. 16.7%, P <0.001).
Conclusion: Request for immediate delivery is a common obstetric emergency. Epidural top-up has become the most common anaesthetic technique. Rapid delivery times can be achieved with an integrated emergency response system.

Keywords: Emergency; Caesarean section; Immediate birth; Decision-to-delivery interval

Introduction

The provision of rapid anaesthesia for immediate birth is a core requirement for an obstetric anaesthetist. A request by obstetricians for an immediate birth may be due to life-threatening fetal or maternal conditions. In this setting, an immediate birth is achieved by category 1 caesarean section in the majority of cases, or less commonly by assisted vaginal birth.[1] In order to facilitate communication and assembly of the appropriate response team, hospitals often have a centralised code/-paging system for these time-critical emergencies. At our institution there is an emergency 'code green' signal that mobilises the personnel and resources required for an immediate birth. [a] Our department first performed a retrospective review of this code green system and established delivery times for emergency caesarean sections in 2007, however neonatal or maternal outcomes were not examined at that time.[2] Given it has been 10 years since that review we considered it was important to

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[a] A code green is activated by the healthcare worker who makes the decision that an immediate birth is required, usually the obstetric registrar or consultant, but sometimes the senior midwife. Once the switchboard has been notified an immediate page goes out to the rostered emergency team, who carry a designated pager for their role, and the team includes: the emergency anaesthetic registrar, obstetric registrar, obstetric residents (2), neonatal intensive care unit (NICU) fellow, NICU registrar, NICU nurse, paediatric registrar, in-charge theatre nurse, theatre technician, and the in-hours or after-hours hospital manager. Concurrently phone calls are made directly from the switchboard to the duty emergency anaesthetist (consultant) and the duty emergency obstetrician (consultant).

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undertake a similar study, to determine changes in current obstetric anaesthesia practice, and to also report on neonatal and maternal outcomes in this high-risk population. The aim of this study was to establish the number of women who required an immediate birth following a code green call, the indications for immediate birth, the modes of anaesthesia used, the critical time intervals and short-term neonatal and maternal outcomes.

Methods

A retrospective review of all women who underwent an immediate birth at the Royal Women's Hospital, Parkville, Australia between January 1, 2013 and December 31, 2014 was conducted following local Human Research Ethics approval (HREC EC00259). An immediate birth was defined as any birth that followed a code green call. A code green at our institution is made in response to a perceived immediate threat to the life of a woman or fetus, necessitating immediate delivery. These women will proceed to a category 1 caesarean section, or deliver by vaginal birth if considered more appropriate.

The switchboard records the emergency code green date, activation time and location of these women. These data were used to identify all code green requests for immediate birth made during the study period. A computerised search of the online theatre system (ORMIS – Operating Rooms Information Management System, Centricity Perioperative Manager) identified most of these women who delivered following a request for immediate birth. A number of women were not identified in the computerised search due to an incorrect procedure code classification. These women were identified by manually reconciling the 'booking time' and operation note with the switchboard code green logbook. Women were excluded from analysis if maternal or fetal condition spontaneously improved and an immediate birth was no longer indicated by the time of clinical review; where medical records were unavailable; or where women could not be identified from the online theatre system. All other women who underwent an immediate birth were included in the dataset for analysis.

Clinical data were retrieved by collating hardcopy medical record information with electronic data from hospital databases (Clinical Lookup and Results Acknowledgment, CLARA; iPM patient administration system, iSOFT). The "decision-to-delivery interval" (DDI) was calculated from the time the emergency code was called, as recorded in the switchboard database, until the time of birth (recorded by the midwifery staff and entered into the online theatre system). The operating room arrival time is a mandatory time recording for each patient entering the operating room and is recorded by the nursing staff; it then is entered into the online theatre system and used to establish the "operating room-to-delivery interval" (OR-D). Demographic, obstetric, maternal and neonatal data were also collected.

Analyses were performed using SPSS (IBM SPSS Statistics Version 24 New York, United States) comparing groups using non-parametric tests. When comparing timing intervals for different anaesthesia modalities, the Kruskal-Wallis one-way analysis of variance on ranks and Dunns' method for multiple comparisons of groups were used.

Results

A total of 14,115 women gave birth to 14,363 babies during the study period. During this time there were 465 requests for immediate birth. After exclusions, 387 women underwent immediate birth (322 by caesarean section, 65 by vaginal birth), resulting in the birth of 399 babies (374 singletons, 12 sets of twins, and one second twin).

The characteristics of women undergoing immediate birth (mean ± SD, range lowest to highest) were as follows: maternal age 32 ± 5.4 years (range 17–51 years), body mass index 24 ± 6.9 kg/m^2 (range 16.7–52.9 kg/m^2), gestation 39 ± 3.6 weeks (24–42 weeks). The majority (75%) of immediate births occurred in women having their first baby. There was no correlation between maternal body mass index and DDI for all immediate births (r=0.017).

Table 1 shows the primary indications for a request for immediate birth. The three most common indications for immediate birth were prolonged fetal bradycardia, as recorded by the obstetrician in the case history, evidence of fetal acidosis (defined as a scalp lactate >4.2 mmol/L), and presumed fetal compromise, as reported by the obstetrician. The latter included any non-reassuring cardiotocogram with unspecified abnormalities.

Table 2 compares the median (IQR) DDI between the caesarean and vaginal delivery groups, stratified by the indication for immediate birth. The median (IQR) DDI for all immediate births was 18 (14–23) min. The median (IQR) DDI for the group of women who underwent immediate birth by caesarean section was 17 (14–23) min compared to 21 (16–28) min for the vaginal delivery group (P <0.001). The most rapid median DDI was achieved in response to cord prolapse, with all cases delivering by caesarean section.

Table 3 shows the median DDI and OR-D times for immediate births by caesarean section, according to the type of anaesthetic performed. Of all immediate births, 87% of babies were delivered within a DDI of 30 min. Immediate delivery by caesarean section resulted in delivery of 89% of babies within a DDI of 30 min

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