

BACKGROUND

Emergency Caesarean section (Em CS) is a major abdominal operation performed to expedite delivery when there is a threat to the life of the woman and/or her fetus. The NICE guidelines have defined Category 2 Em CS as maternal or neonatal compromise which is not immediately life threatening and recommended a 75 mins decision to delivery interval (DDI).

Historically, the 30mins DDI was used as a cut off for all Em CS, but there was no strong evidence it improved maternal/fetal outcomes (1). Additionally, it was difficult to achieve the 30mins DDI in certain clinical settings (2, 3). Hence, ≤ 75mins DDI for Cat 2 CS was established. Some studies have suggested that exceeding the 75 mins DDI was associated with adverse outcomes (4, 5), while another study reported that meeting the 75mins DDI did not improve fetal outcomes (6). A couple of recent studies from Singapore & the UK investigated the DDI more closely (6, 7)

OBJECTIVE

The aim is to determine the ability of an Australian tertiary maternity department in meeting the 75 mins DDI, identify any causes for delays and investigate if those delays have negatively affected maternal and neonatal outcomes.

METHODS

Design

- Retrospective cohort study using data gathered from the birth register and medical charts
- Time frame: 01/01/2019 to 31/12/20
- Location: RBWH, a tertiary maternity hospital in Brisbane, QLD, Australia

Population

- A total of **9413** women gave birth to **9614** babies
- 3468/9413 (36.8%)** women underwent Em CS
 - 1928/3468 (55.6%)** were Em CS
 - 1207/1928 (62.6%)** were categorized as *Category 2* Em CS that delivered 1267 babies
 - 1148 (95.1%)** were singletons; **58 (4.8%)** were twins; **1 (0.08%)** were triplets
 - 1253 (98.9%)** were live births; **10 (0.79%) ended** in neonatal deaths; **4 (0.32%)** were stillbirths prior to delivery
- Exclusion criteria: stillbirths prior to delivery

Outcomes

- Proportion of Cat 2 Em CS meeting the 75mins DDI
- Reasons for delay and not achieving the DDI
- Differences in outcomes between those that achieve the 75mins DDI and the cohort that doesn’t
 - Maternal: Length of inpatient hospital admission, EBL ≥ 1000mls
 - Neonatal: Admission to SCU/NICU, length of stay (LoS), APGAR ≤7 at 5 mins, Arterial pH < 7.10, neonatal death

Statistical analysis: Analysis was done with GraphPad Prism 9 by using the Student T-test and Pearson’s chi-square test where applicable. A P-value of <0.05% was taken as statistically significant.

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Table 1: DDI AS PER PLURALITY				
	Total (n = 1207)	DDI (≤75 mins) achieved	DDI <u>NOT</u> achieved	P-value <0.05)
Singleton	1148 (95.2%)	616/1148 (53.6%)	21/59 (35.6%)	0.0074
Multiple Pregnancies	59 (4.9%)	532/1148 (46.3%)	38/59 (64.4%)	

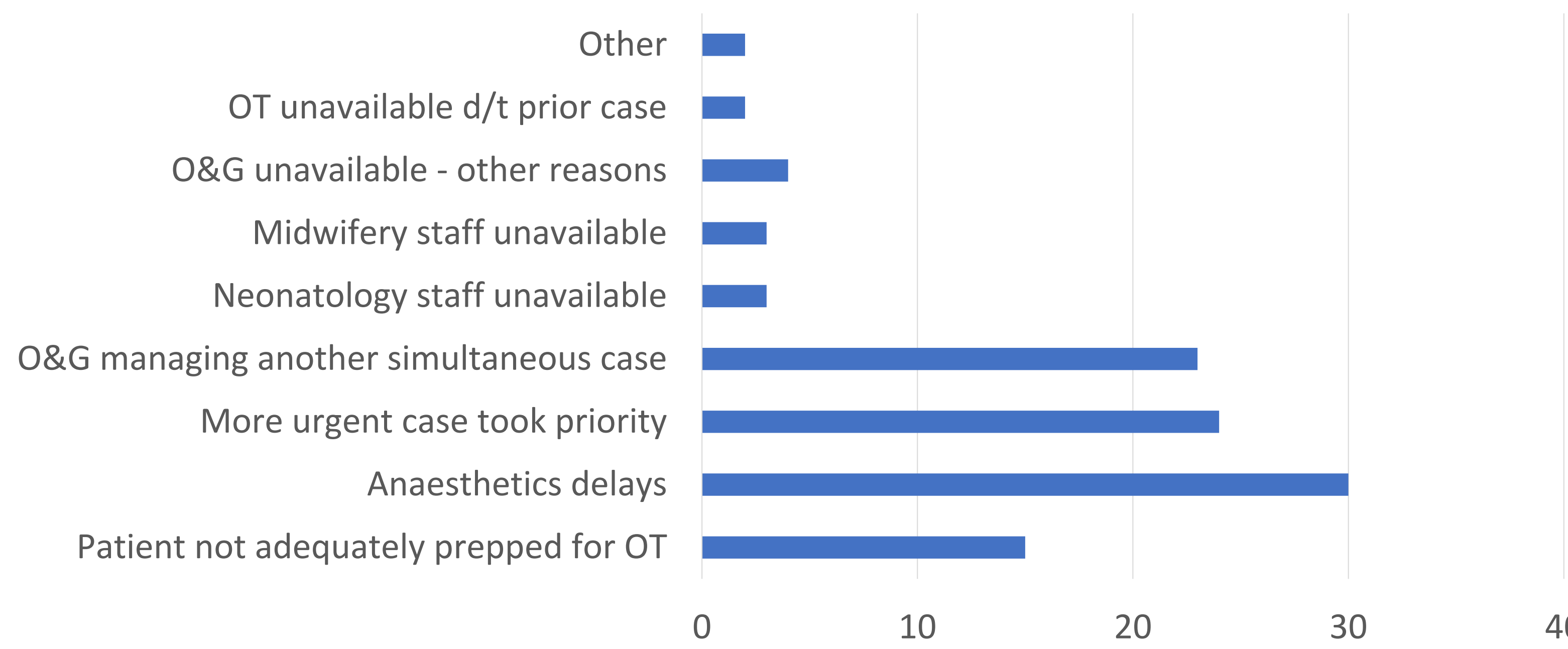
Table 2: DDI AS PER PARITY				
	Total (n = 1207)	DDI (≤75 mins) achieved	DDI <u>NOT</u> achieved	P-value (<0.05)
Nulliparous	840 (69.5%)	487/840 (58.0%)	353/840 (42.0%)	<0.0001
Multiparous	367 (30.5%)	150/367 (40.9%)	217/367 (59.1%)	

Table 3: COMPARISON OF BASELINE DEMOGRAPHICS				
Characteristics	Total	DDI (≤ 75mins) Achieved	DDI <u>NOT</u> Achieved	P-Value (<0.05)
Maternal Age	(n = 1207)	(n = 637)	(n = 570)	0.93
-Mean ± SD (yrs)	30.8 ± 5.1	30.9 ± 4.9	30.8 ± 5.3	
Pre-preg BMI	(n = 1179)	(n = 621)	(n = 558)	0.003
Mean ± SD (kg/m²)	25.9 ± 6.2	25.4 ± 5.4	26.5 ± 6.9	
-BMI ≥ 40 (%)	3.2% (38/1179)	2.0% (13/637)	4.5% (25/558)	
Gestational Age	(n = 1207)	(n = 637)	(n = 570)	<0.0001
Mean ± SD (yrs)	38w0d ± 3w5d	38w3d ± 3w2d	37w2d ± 4w0d	
Birthweight	(n = 1263)	(n = 658)	(n = 605)	<0.0001
-Mean ± SD (g)	3044 ± 931.5	3155 ± 842.3	2923 ± 1006	
Length of Stay	(n = 1207)	(n = 637)	(n =570)	<0.0001
- Mean ± SD (days)	4.5 ± 3.7	4.1 ± 2.5	4.9 ± 4.6	

Table 4: MATERNAL OUTCOMES				
EBL ≥ 1000mls		Length of Stay		
	(%)	P-value (<0.05)	Mean (days)	P-value (<0.05)
DDI achieved	84/637 (13.2%)	0.60	4.1 ± 2.5	<0.0001
DDI <u>not</u> achieved	69/570 (12.1%)		4.9 ± 4.6	

Table 5: NEONATAL OUTCOMES										
Neonatal Death		Admission to SCN/NICU (%)		LoS in SCN/NICU (days)		APGAR ≤ 7 at 5 mins		Arterial pH ≤ 7.10		
	(%)	P-value (<0.05)	(%)	P-value (<0.05)	(%)	P-value (<0.05)	(%)	P-value (<0.05)	(%)	P-value (<0.05)
DDI achieved	3/658 (0.456%)	0.21	346/658 (52.6%)	0.07	8.2 ± 16.6	<0.0001	72/658 (10.9%)	0.04	27/589 (4.58%)	0.22
DDI <u>not</u> achieved	7/605 (1.16%)		349/605 (57.7%)		12.6 ± 22.9		90/605 (14.9%)		17/548 (3.1%)	

GRAPH 1: DOCUMENTED REASONS FOR DELAY IN ACHIEVING 75MINS DDI



** Only 106/570 of the “DDI NOT Achieved” cohort had appropriately documented reasons for delay.

RESULTS

- Almost half, **47.2% (570/1207)**, did not meet the recommended 75 mins DDI.
- The average delay was **63mins** in the “DDI not achieved” cohort
- Top 3 reasons for delays were (Graph 1):
 - Anaesthetics issues**
 - A more urgent case that took priority**
 - O&G staff unavailable b/c they were managing another concurrent emergent case**
- Multiparous women and multiple pregnancies were more likely to fail to achieve the recommended DDI (Table 1 and 2)
- The “DDI not achieved” cohort was more likely have
 - Higher pre-pregnancy BMI -- particularly the % of those with BMI >40 (Table 3)
 - Longer hospital admissions for mothers (Table 4)
 - Lower average birth weight (Table 3)
 - Younger gestational age at birth (Table 3)
 - Longer SCN/NICU admissions (Table 5)
 - Higher incidence of low APGAR scores at 5min (Table 5)

DISCUSSION

Despite having a 24/7 dedicated obstetrics operating theatre, the 75 mins DDI was only achieved about 50% of the time, but it did not appear to significantly affect maternal and neonatal outcomes.

Women with higher BMI may be more difficult to transport from birthing suite to the operating theatre and more challenging to anaesthetise. This could explain the delay in DDI.

Multiple pregnancies may also have contributed to delays in achieving the recommended DDI. They are associated with preterm births, which often require additional staff to be readily available at the time of the delivery. The average lower birthweight and younger gestational age lend support to prematurity, which can prolong SCN/NICU admission & be associated with lower APGAR scores.

The main constraint of this study is the reliance on proper data entry, which if inaccurate or missing, can limit the reliability of the conclusions gained from the analysis. Possible suggestions to improve observance of the 75mins DDI would include increasing staff availability, ensure timely anaesthetics review, and standardized documentation of Em CS including reasons for delays