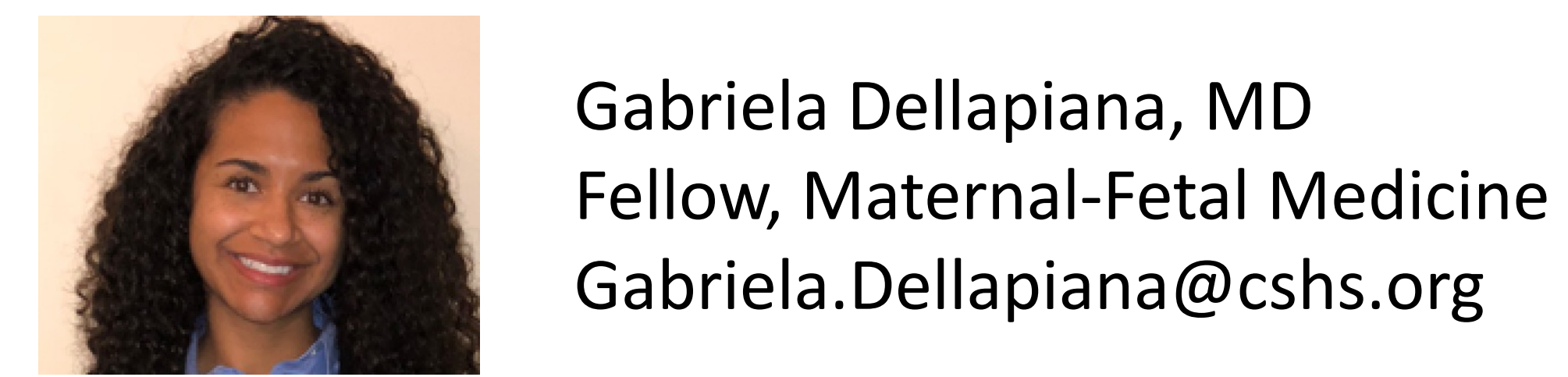


General Anesthesia at Time of Emergent Cesarean Delivery and Adverse Neonatal Outcomes

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BACKGROUND

- Emergent (or “crash”) cesarean delivery (CD) is associated with increased risk for neonatal metabolic acidosis
- General anesthesia (GETA) is often necessary for emergent CD
- GETA may impact neonatal resuscitation

OBJECTIVE

- Evaluate adverse neonatal outcomes in patients with GETA at time of emergent CD vs neuraxial anesthesia

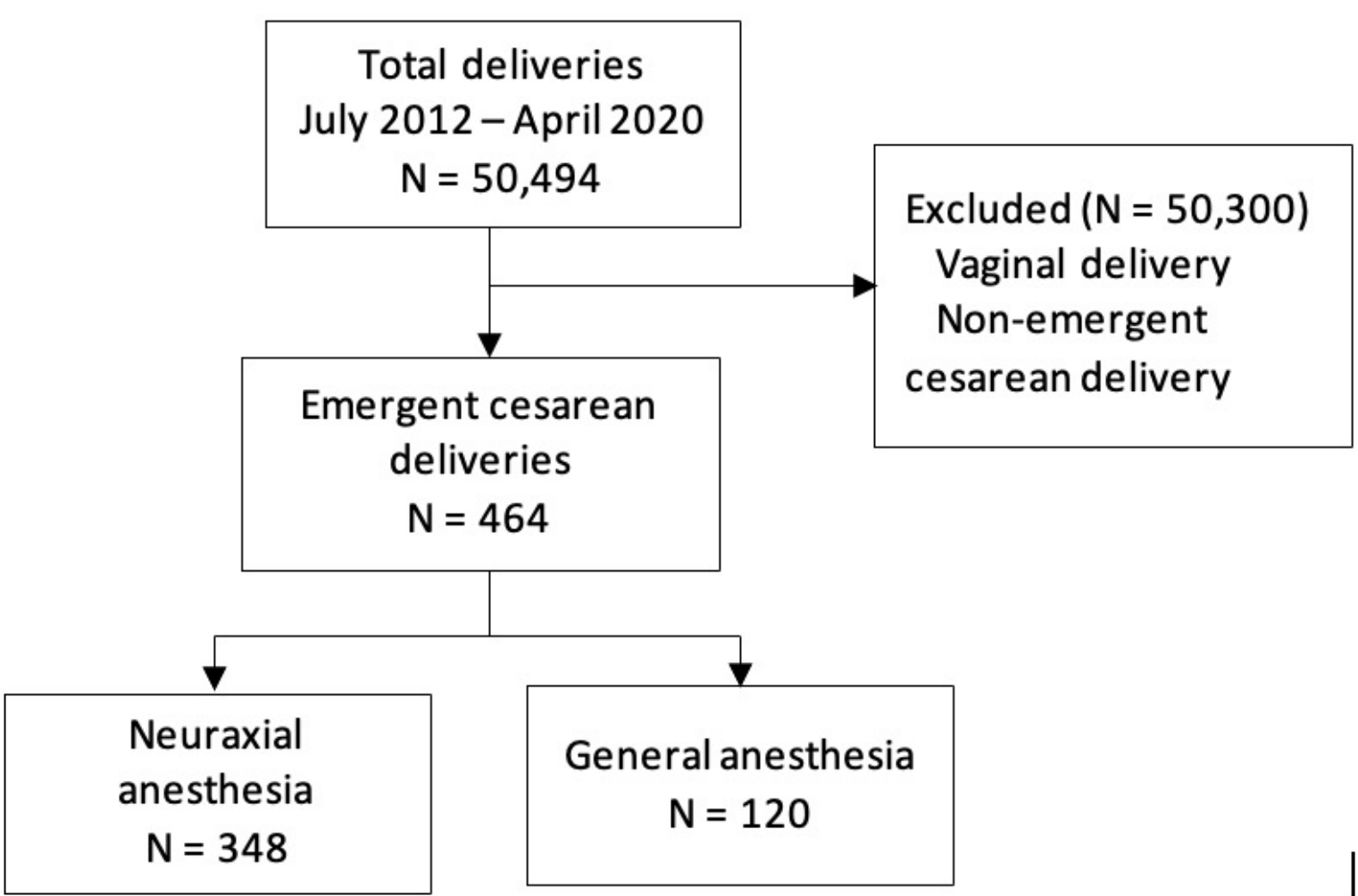
METHODS

- Cohort study of patients undergoing emergent CD from July 2012 – April 2020
- Stratified by anesthesia type: GETA vs neuraxial
- Primary outcome: composite of markers for neonatal metabolic acidosis including arterial cord pH ≤7.0, base excess ≥12, or 5-minute Apgar <7
- Secondary outcomes: NICU admission, neonatal death
- Adjusted for BMI, twin gestation, preterm delivery, low birth weight, and indication for emergent CD

RESULTS

- Of 468 emergent CD, GETA was required in 26% (N=120)
- Composite primary neonatal outcome occurred more frequently in patients with GETA than neuraxial (40% vs 21%, p<0.001)

Figure 1. Flow diagram of patients with emergent cesarean delivery and general anesthesia



General anesthesia at time of emergent cesarean delivery is associated with increased risk for adverse neonatal outcomes and NICU admission.

Table 3. Unadjusted and adjusted odds for adverse neonatal outcomes in patients receiving general anesthesia at the time of emergent cesarean delivery

	OR (95% CI)	P	aOR (95% CI)*	Adjusted P*	aOR (95% CI)†	Adjusted P†
Composite	2.5 (1.6-3.9)	.000	2.3 (1.4-3.7)	.001	2.5 (1.5-4.2)	.001
5-minute Apgar <7	3.6 (2.2-6.1)	.000	3.2 (1.8-5.6)	.000	3.1 (1.7-5.6)	.000
NICU admission	3.6 (2.3-5.5)	.000	1.8 (1-3)	.044	1.9 (1.1-3.4)	.034
Neonatal death	3.5 (1.2-10.7)	.026	1.6 (0.5-5.3)	.442	1.8 (0.5-6)	.374

*Initial adjusted model, adjusted for BMI, twin gestation, preterm delivery, low birth weight
†Fully adjusted model, adjusted for BMI, twin gestation, preterm delivery, low birth weight, indications for delivery
OR, odds ratio; aOR, adjusted OR; NICU, neonatal intensive care unit

Table 1. Patient demographics and pregnancy characteristics by exposure to general anesthesia at the time of emergent cesarean delivery

	General Anesthesia N=120	No General Anesthesia N=348	P
Age (years)	33.7 ± 5.6	33.9 ± 5.1	.751
BMI (kg/m²)	28.2 ± 5	29.7 ± 5.7	.007
Race			.908
Asian	17 (14)	47 (14)	
Black	18 (15)	54 (16)	
Other	14 (12)	33 (9)	
White	71 (59)	214 (61)	
Ethnicity			.832
Hispanic	19 (16)	58 (17)	
Nulliparity	65 (54)	212 (61)	.194
Twin gestation	14 (12)	18 (5)	.015
Gestational age (weeks)	36.9 (30.9-39)	39.3 (37.9-40.1)	.000
Preterm delivery (<37 weeks)	62 (52)	62 (18)	.000
Prior CD	22 (18)	53 (15)	.424
Indication for emergent CD			.000
NRFHT	64 (53)	264 (76)	.000
Cord prolapse	23 (19)	24 (7)	.000
Malpresentation in labor	13 (11)	14 (4)	.006
Failed operative vaginal delivery	3 (3)	32 (9)	.016
Uterine rupture	5 (4)	6 (2)	.128
Vaginal bleeding	9 (8)	7 (2)	.004
Skin incision to delivery (min)	2.1 ± 1.3	2.4 ± 1.9	.123
CD duration (min)	56 (43-68)	52.5 (42-68)	.201

Data are mean ± SD, median (IQR), or N (%); P-value by χ², t-test, or Wilcoxon ranksum as appropriate
BMI, body mass index; CD, cesarean delivery; NRFHT, non-reassuring fetal heart tracing

Table 2. Neonatal outcomes by exposure to general anesthesia at the time of emergent cesarean delivery

	General Anesthesia N=120	No General Anesthesia N=348	P
Composite ^a	48 (40)	74 (21)	.000
Arterial cord blood gas ^b			
pH ≤7.0	18 (16)	43 (14)	.570
BE ≥12	14 (13)	35 (11)	.740
5-minute Apgar <7	37 (31)	38 (11)	.000
Birthweight (g)			.000
Low birthweight (≤2500g)	63 (53)	63 (18)	.000
1-minute Apgar	4.7 ± 2.7	6.6 ± 2.4	.000
5-minute Apgar	7 ± 2.4	8.2 ± 1.6	.000
10-minute Apgar	6.5 ± 1.8	7 ± 2.3	.386
pH	7.15 ± 0.1	7.13 ± 0.1	.079
BE	6 ± 5	7 ± 4	.215
pCO2	69 ± 22	70 ± 18	.523
pH≤7.1	32 (29)	116 (37)	.093
NICU admission	82 (68)	131 (38)	.000
Neonatal death	7 (6)	6 (2)	.018

Data are mean ± SD or N (%)
BE, base excess; NICU, neonatal intensive care unit
^aComposite neonatal outcome includes arterial cord pH ≤7.0, base excess ≥12, or 5-min Apgar <7
^bArterial cord blood gas data available for 422 patients (N=112 GETA; N=310 no GETA)



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