

Understanding Local Contributors to Maternal Hemorrhage in Cesarean Delivery

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Objective: Understanding the Problem is the First Step to Sustainable System Change

Academic Medical Center

- Level 4 Maternal Care Center, Level III NICU, ~ 2500 deliveries, 33% cesarean deliveries (CD)
- 27% of CD from 2018-2021 complicated by hemorrhage
- Previous data analysis demonstrated racial & ethnic disparities in several maternal outcomes, including hemorrhage
- Multidisciplinary team sought to determine local contributors to hemorrhage during CD
- Goal: system analysis to devise interventions to reduce hemorrhage

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Methods:

- 36-month retrospective EMR review August 2018 - August 2021
- Inclusion: CD, ≥ 37 weeks gestation, singleton, non-anomalous fetus in vertex position

- Factors evaluated

Maternal (non-modifiable)	Maternal (modifiable)	Delivery variables
<ul style="list-style-type: none">• Age• Race	<ul style="list-style-type: none">• Body mass index• Tobacco use• Insurance status• Prenatal care• Relationship status• SARS-CoV-2 diagnosis	<ul style="list-style-type: none">• Indication for CD• Anesthesia type• Pitocin administration during labor

- Factors were analyzed for odds ratio (OR) of hemorrhage compared to given reference values with a 95% confidence interval (CI)

Data extraction yielded:

- Sample of 1,814 hospital records for analysis

Results

The following factors significantly increased odds of maternal hemorrhage with CD:

- Non-Hispanic, Black
- Hispanic/Latino
- Severe obesity
- Labor epidural anesthetic conversion
- GETA

The following factors did not significantly increase odds of maternal hemorrhage with CD

- PNC initiation 1st trimester
- Pitocin administration
- Insurance status
- Relationship status
- SARS-CoV-2 diagnosis

Risk stratification should be considered by local providers

Factors	No hemorrhage (n=1324), n (%)	Hemorrhage (n=489), n (%)	OR	95% CI
Race				
Non-Hispanic White	635 (48.0)	198 (40.5)	Reference	Reference
Non-Hispanic Black	440 (33.2)	184 (37.6)	1.341*	1.061-1.696
Hispanic/Latino	109 (8.2)	50 (10.2)	1.471*	1.015-2.132
Other	140 (10.6)	57 (11.7)	1.306	0.923-1.847
Body mass index				
Normal (18.5-24.9)	56 (4.8)	11 (2.6)	Reference	Reference
Overweight (25-29.9)	250 (21.5)	85 (20.3)	1.731	0.867-3.457
Obese 1 (30-34.9)	322 (27.7)	122 (29.1)	1.929	0.978-3.804
Obese 2 (35-39.9)	250 (21.5)	82 (19.6)	1.67	0.835-3.339
Obese 3 (≥40)	283 (24.4)	119 (28.4)	2.141*	1.083-4.229
Tobacco use				
Never	880 (67.0)	355 (73.0)	Reference	Reference
Previous or current	433 (33.0)	131 (26.8)	0.75*	0.595-0.945
Indication for cesarean section				
Parturient & fetal history	777 (62.7)	179 (38.2)	Reference	Reference
Placental & uterine pathology	19 (1.5)	18 (3.8)	4.112*	2.115-7.995
Labor-related	410 (33.1)	256 (54.7)	2.710*	2.164-3.395
Elective	33(2.7)	15(3.2)	1.973*	1.049-3.711
Anesthesia type				
Spinal/combined spinal epidural	608 (54.8)	141 (34.5)	Reference	Reference
Labor epidural	470 (42.3)	241 (58.9)	2.211*	1.739-2.811
General	32 (2.9)	27 (6.6)	3.638*	2.112-6.268