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# Rate of Unscheduled Administration of an Epidural Bolus Among Pregnant Women Receiving Labor Epidurals

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## Background

The labor and delivery process is a painful experience that pregnant women undergo and while various medical options are available for managing labor pain, labor epidurals are the most common.<sup>1,3</sup> Breakthrough pain, or inadequate analgesia, is a significant complication of labor epidurals that is typically managed with the administration of an unscheduled epidural bolus.

The purpose of this evidence-based practice (EBP) project is to describe the rate of unscheduled epidural bolus administration in pregnant women receiving continuous labor epidurals (CLE) at Providence Sacred Heart Medical Center (PSHMC) and Providence Holy Family Hospital (PHFH).

## Methods

- *Design:* Retrospective, observational, EBP project
- *Human subjects protection:* De-identified data was extracted into a HIPPA compliant REDCap database after facility approval and IRB exemption
- *Inclusion Criteria:* Parturient women age ≥18 with labor epidurals at PSHMC and PHFH from January 2015 to December 2019 (Table 1)
- *Outcome Measurement:* Unscheduled provider administered epidural bolus after epidural initialization (Figure 1)
- *Bivariate:* T-tests (symmetrical continuous data), Mann Whitney U (skewed continuous data), Chi-Test (categorical data)
- *Multivariate:* Kaplan Meier analysis performed on epidural bolus timing (Figure 2)
- *Multivariate multivariable:* Proportional hazards model was used to identify independent risk factors associated with time to first unscheduled provider administered epidural bolus (Table 2)

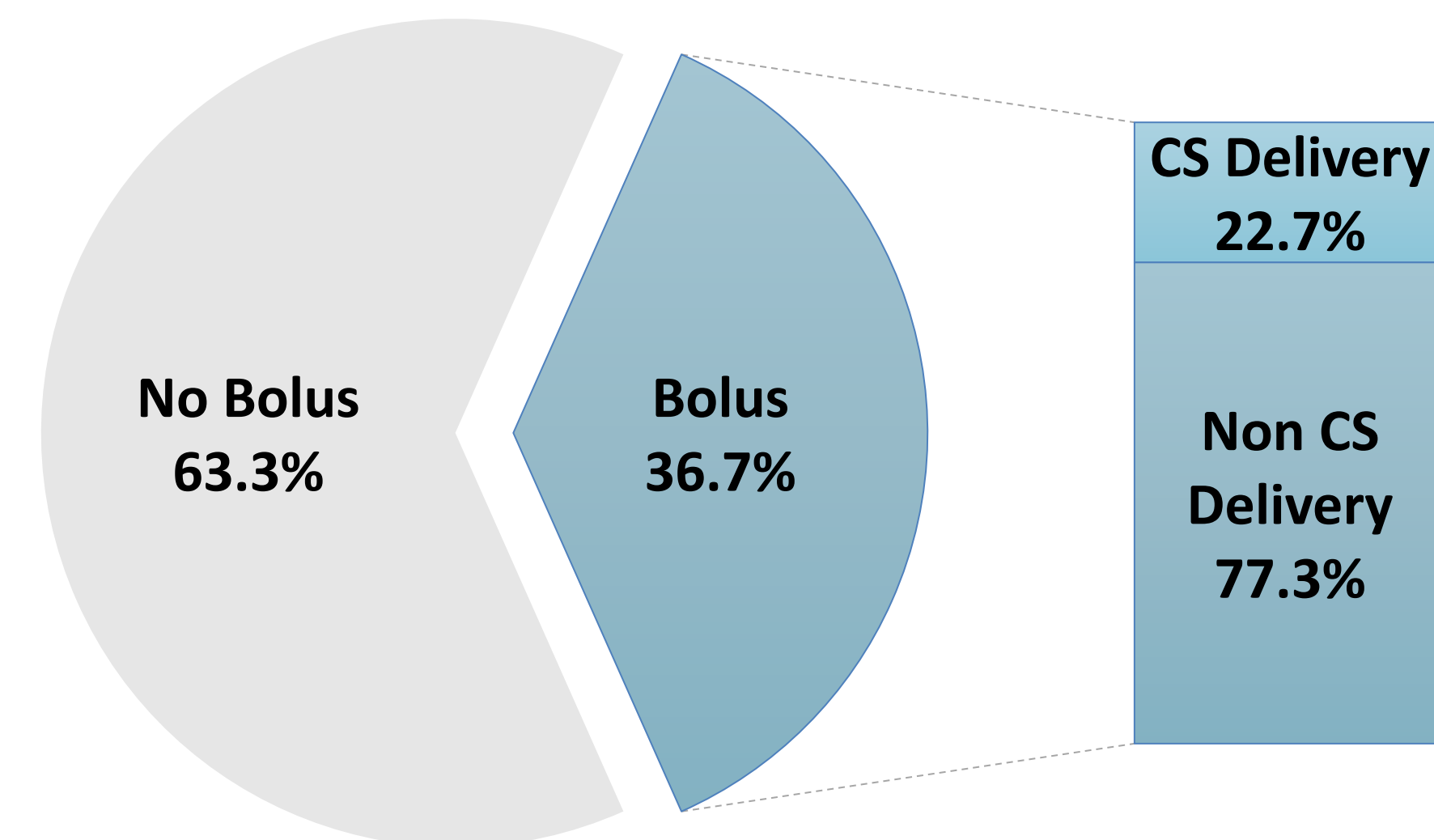
## Findings

**Table 1. Baseline Demographics and Characteristics of Parturients with Labor Epidurals (n=9,969)**

Variable	Mean	SD
Age (years)	28.5	5.3
	<b>Median</b>	<b>IQR</b>
BMI (kg/m <sup>2</sup> )	31.1	27.9 - 35.3
CLE duration (hours)	12.8	10.4 - 16.3
	<b>Count</b>	<b>Percent</b>
PSHMC	7,365	73.9%
PHFH	2,604	26.1%
Elective Case	6,019	60.4%
Non-Elective Case <sup>a</sup>	3,950	39.6%
Gravida 1	3,567	35.8%
Gravida ≥2	6,402	64.2%
CS delivery <sup>b</sup>	997	10.0%
Non-CS delivery <sup>c</sup>	8,972	90.0%
Single CLE	9,262	92.9%
Multiple CLE <sup>d</sup>	707	7.1%

BMI – Body Mass Index; CLE – Continuous Labor Epidural; CS – Cesarean Section; IQR – Interquartile Range; PHFH – Providence Holy Family Hospital; PSHMC – Providence Sacred Heart Medical Center; SD – Standard Deviation; a – Urgent and Emergent; b – Unscheduled; c – Includes all types of vaginal deliveries; d – CLE replaced at least one time

**Figure 1. Incidence Rate of Provider Administration of an Unscheduled Epidural Bolus**

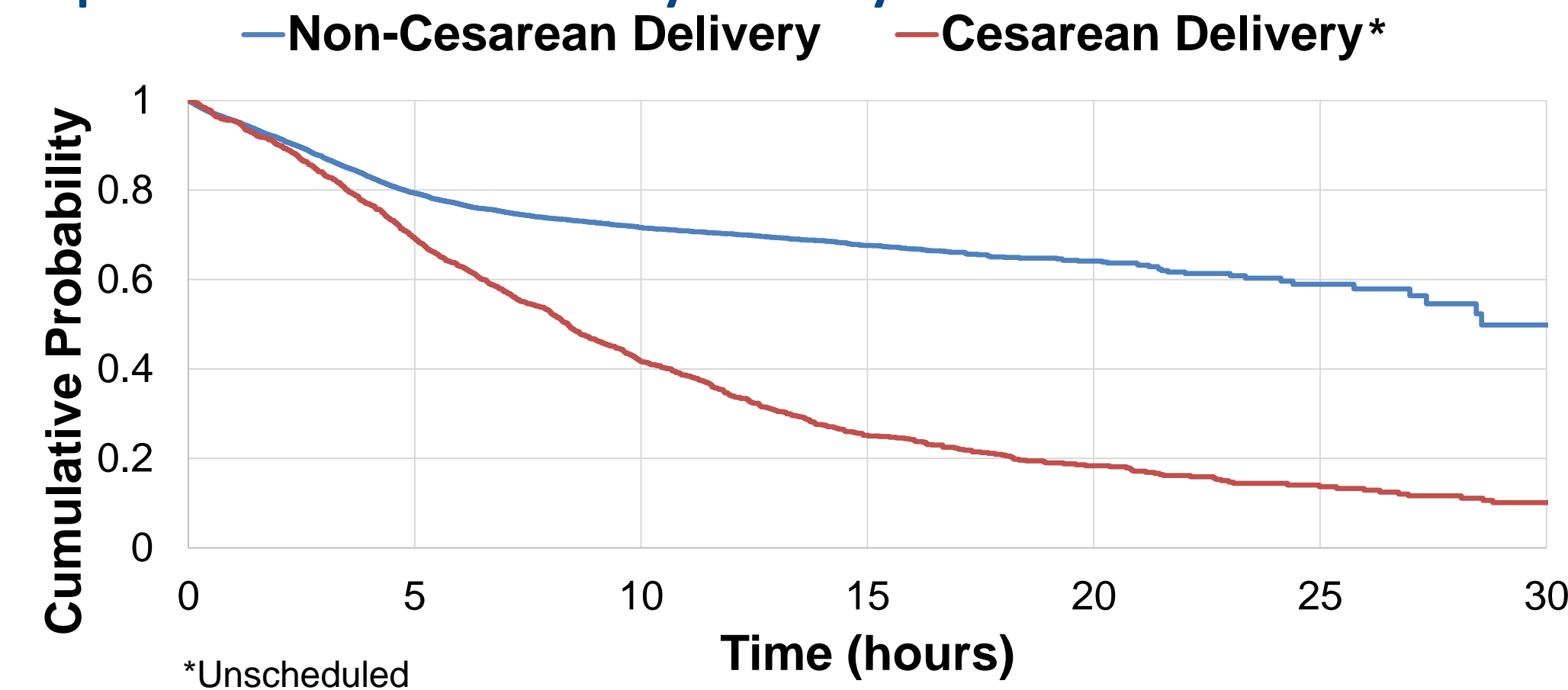


**Table 2. Independent Risk Factors Associated with Time to First Unscheduled Epidural Bolus Administration**

Covariate	p-Value	Hazard	95% CI
Facility	0.28	1.05	0.96 – 1.14
Age	0.46	1.00	0.99 – 1.00
Gestational Age	0.1	1.00	1.00 – 1.00
BMI (kg/m <sup>2</sup> )	<b>&lt;0.001</b>	<b>1.02</b>	<b>1.01 – 1.02</b>
Gravida	<b>&lt;0.001</b>	<b>1.22</b>	<b>1.14 – 1.31</b>
Elective Case	<b>&lt;0.001</b>	<b>1.14</b>	<b>1.06 – 1.23</b>
CLE Duration (hours)	<b>&lt;0.001</b>	<b>1.04</b>	<b>1.03 – 1.04</b>

CI – Confidence Interval; **Bold** signifies statistically significant risk factors

**Figure 2. Time to First Unscheduled Provider Administered Epidural Bolus Stratified by Delivery Mode**



**Table 3. Estimated Number of Parturients at Risk for Receiving an Unscheduled Provider Administered Epidural Bolus**

Cesarean Delivery							
Hour	0	5	10	15	20	25	30
At Risk	997	671	346	149	68	29	10
Percent*	100%	67%	38%	22%	17%	12%	9%
Non-Cesarean Delivery							
Hour	0	5	10	15	20	25	30
At Risk	8,972	7,010	4,161	1,028	242	49	12
Percent*	100%	79%	71%	68%	65%	61%	48%

\*Cumulative probability

## Discussion

We found that approximately 36.7% of parturient women with a CLE required at least one unscheduled provider administered epidural bolus. Gravida 1, elective case type, increased BMI and CLE duration were identified as independent risk factors associated with receiving a provider bolus. Of the identified risk factors, gravida 1 was the most significant with women having a 1.22 increase in risk of requiring an unscheduled provider administered epidural bolus (hazard risk 1.22; 95% CI 1.14 – 1.31; p <0.001).

The rate of 36.7% is higher compared to literature reported rates of 30.7% and 14.4% from RCTs and observational studies that had comparable epidural regimens and techniques to our facilities.<sup>2,4,5</sup> Further in-depth investigation is warranted in describing with more detail the patient characteristics and anesthesia provider practices as they relate to unscheduled epidural bolus administration.

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