Enhanced Recovery After Cesarean Delivery Impacts Foley Removal Times and Urinary Retention

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Background:

SOAP ERAC recommends neuraxial long-acting opioid (NLO) *AND* urinary catheter removal ≤12 H after cesarean delivery (CD)

- Increased patient comfort/ambulation
- ↓Systemic opioid use, ↓symptomatic UTI, shortened LOS
- Neuraxial opioids → Urinary dysfunction

Intervention:

Implementation of ERAC with NLO and a nursing protocol for urinary interventions on September 1, 2022.

Aim

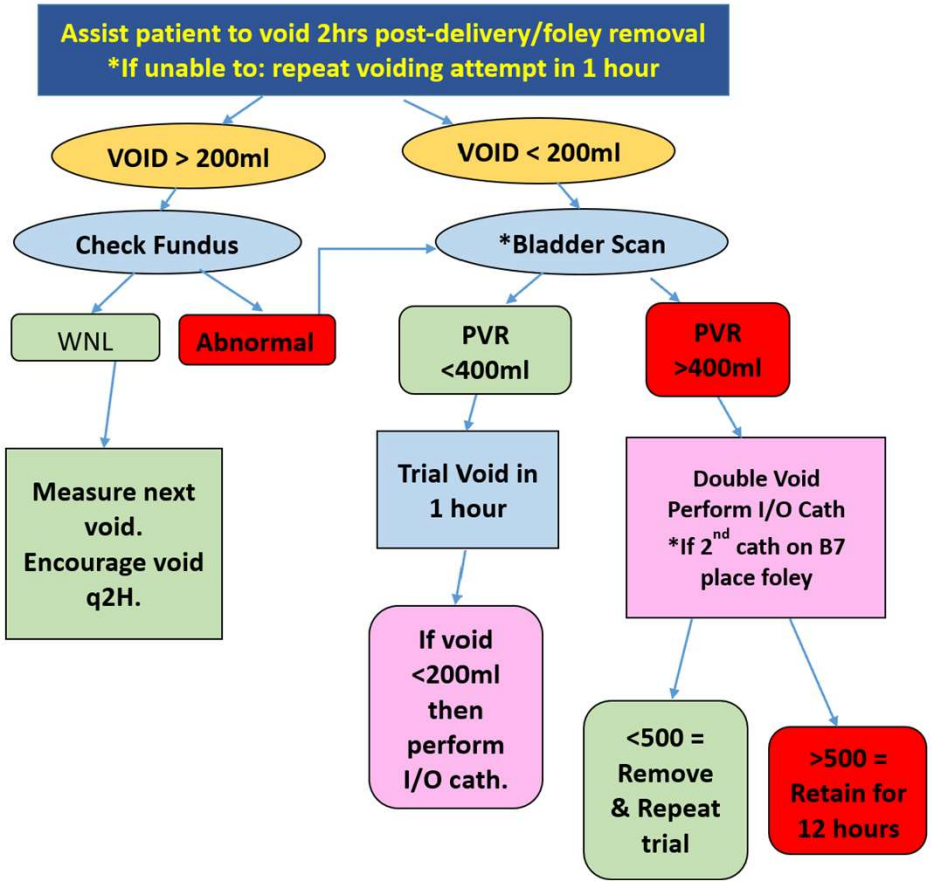
Determine urinary outcomes before versus after ERAC

- **Primary outcome**: time to initial Foley removal after delivery (iFR)
- **Secondary outcomes**: occurrences of straight catheterization (SC) and foley reinsertion (FR)

Hypothesis

Implementation of ERAC results in decreased time to iFR after CD and increased prevalence of bladder emptying procedures.

Post-ERAC Urinary Retention Protocol



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Methods

Study Design: *Single site, Retrospective Cohort*

Patient Population:

- CD 28.5 months before (pre-) and 19 months after (post-) ERAC implementation
- Post-ERAC: Received MSO4 0.1 mg IT or 2 mg EA

Exclusion Criteria:

- Postop MgSO4
- Postop EA
- Cesarean hysterectomy
- iFR >20 H
- Failure to use neuraxial MSO4 post-ERAC
- Buprenorphine or methadone MOUD

EMR Data Extracted:

- Demographics/comorbidities
- Neuraxial morphine route (post-ERAC)
- Time to initial foley removal after delivery (iFR)
- Occurrences of SC, FR or blood transfusion
- Presence of Preop EA
- Lowest Hematocrit (48 hours post-CD)

Statistical Analyses:

- Pre-ERAC vs. post-ERAC cohorts
- T- and chi-squared tests, Fisher's exact test for demographics
- Kaplan Meier plot from Cox regression for iFR
- Logistic and linear regressions for primary and secondary outcomes

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Results

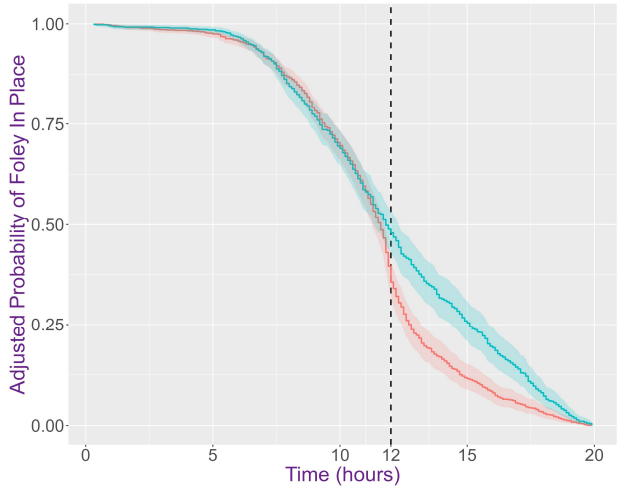
TABLE 1: Demographic Characteristics

		Pre-ERAC (n =866)	Post-ERAC (n =1113)	p value
Average Age at Delivery, *years*		31.72	32.39	**0.006**
Primary Race				0.211
Ethnicity				0.914
BMI, *kg/m²*		34.45	34.4	0.882
Gravidity				0.316
	1	251 (29%)	338 (30%)	
	2	267 (31%)	346 (31%)	
	≥3	348 (40%)	429 (39%)	
Parity				0.826
	0	371 (43%)	490 (44%)	
	1	312 (36%)	397 (36%)	
	≥2	183 (21%)	226 (20%)	
In Hospital Blood Transfusion		16 (1.8%)	34 (3.1%)	0.120
Lowest HCT (48 hours post-CD), %		29.5	29.3	0.265
Comorbidity Gestational Hypertension		58 (8.0%)	116 (10%)	0.091
Comorbidity Diabetes Mellitus		115 (13%)	154 (14%)	0.770

Table 2: Adjusted Urinary Catheter Removal

	Pre-ERAC (n = 866)	Post-ERAC (n = 1113)	Adjusted Odds Ratio	p value
Adjusted Hours to Initial Foley Removal after Delivery (iFR)	10.6	10.3	-	**<0.001**
# Straight Catheterizations (SC)	37/866 (4.2%)	114/1113 (10.2%)	2.52	**<0.001**
# Foley Reinsertions (FR)	10/866 (1.2%)	31/1113 (2.9%)	2.30	**0.026**

Adjusted for: Age at Delivery, BMI, CS Ordinality, Gestational DM, Gestational HPT, Labor Epidural, Minimum Hematocrit, Planned/Unplanned CS, Transfusion



ERAC ≤12h iFR: 64.2% (vs. 52.3%)

- Straight cath (SC): 10.9%
  - Preop LEA: OR 2.1 (p = 0.02)
- Foley reinsertion: 3.2%

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Discussion:

- ERAC implementation resulted in earlier iFR; compliance with iFR ≤12H = 64.2%
- Post-ERAC straight catheterization (SC) and Foley reinsertion (FR) rates increased with ERAC, likely related to neuraxial MSO4-induced urinary dysfunction.
- Most patients requiring SC did not require FR; likely due to waning urinary dysfunction in the 14-18H after neuraxial MSO4 administration
- Preop LEA was associated with increased SC but not iFR or FR

Limitations:

- Retrospective
- Impact of concurrent implementation of urinary protocol with ERAC is unknown

Conclusions:

- Straight catheterization and Foley reinsertion rates are low following ERAC with neuraxial morphine
- iFR by 12H should be emphasized and assessed

Future work:

- Identify barriers to ≤12H iFR
- Evaluate association of LEA with SC prevalence