

A retrospective cohort study comparing catheter replacement rates with programmed intermittent epidural bolus and continuous epidural infusion

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Methods

Objectives:

- LEA maintained with PIEB has a decreased rate of catheter replacement compared to CEI
- Secondary hypothesis: LEA initiated with CSE has a decreased rate of catheter replacement compared to EPID.
- Compare institutional rate of LEA catheter failure against published rates.

Study Design:

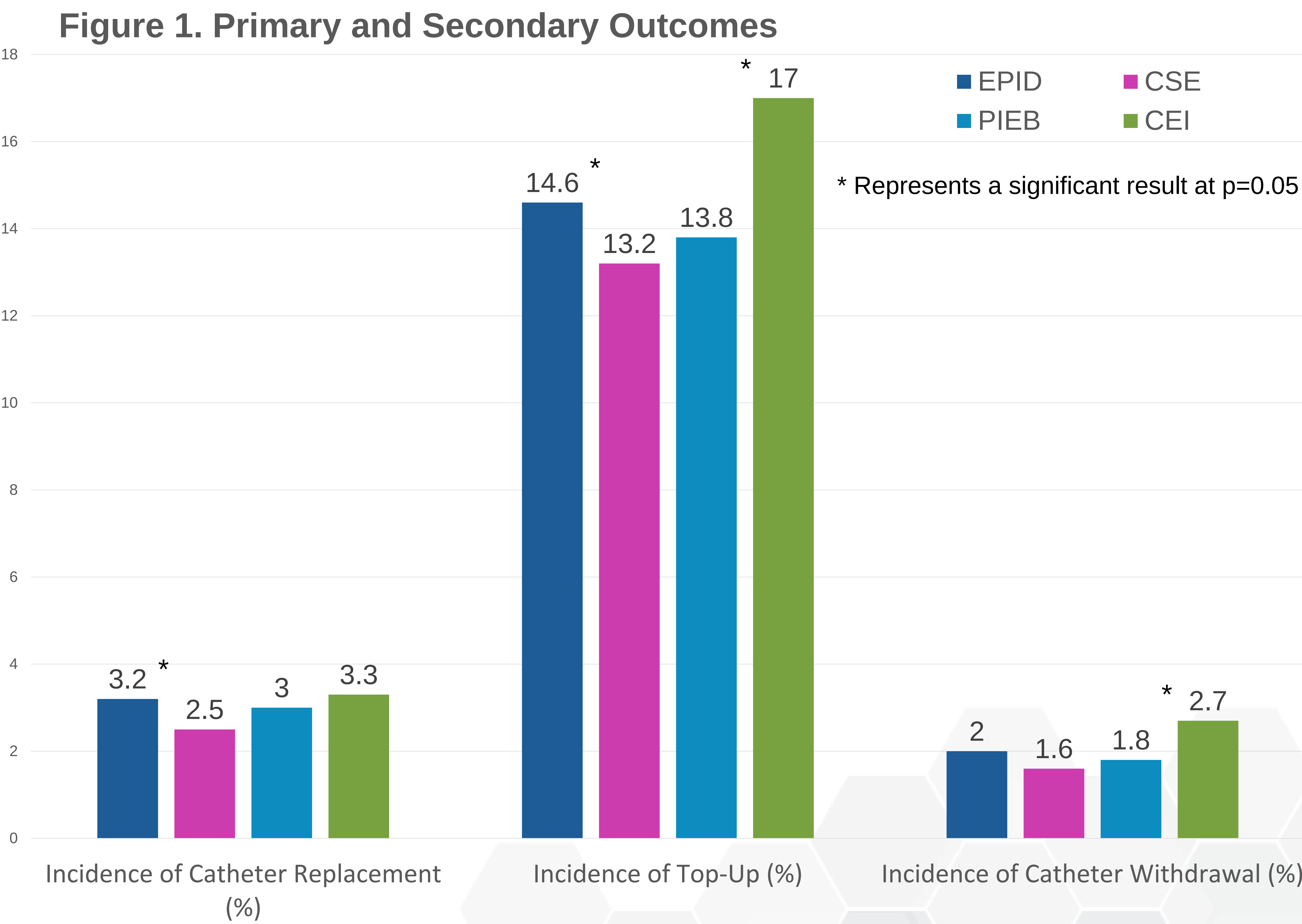
- Historical cohort study: Jan 1, 2012 - Dec 31, 2019
 - Continuous: CSE vs EPID
 - Before-After 2015: PIEB vs CEI
- Indexed and linked cases from two databases:
 - Innovian anesthetic record
 - Provincial perinatal database

Table 1. IWK Default Initial Dose and Epidural Pump Parameters

	CSE Initial Dose	Epidural Initial Dose	Timing of Maintenance	Maintenance Solution	Maintenance Dose	PCEA Dose
PIEB	0.8mL bupivacaine 0.25% + 10mcg fentanyl	10mL ropivacaine 0.2% + fentanyl 10mcg/mL	15m after placement	Ropivacaine 0.1% + fentanyl 2mcg/mL	8mL q45m	6mL q10m PRN
CEI			Immediate		6ml/h	



Table 2. Patient and Delivery Characteristics						
	EPID (n = 11,277)	CSE (n = 4082)	<i>P value</i>	PIEB (n = 13,177)	CEI (n = 2182)	<i>P value</i>
Maternal age, mean [SD]	29.73 [5.2]	29.74 [5.2]	0.945	29.7 [5.2]	29.5 [5.2]	0.058
Body Mass Index (BMI) at Delivery, mean [SD]	31.4 [6.4]	31.6 [6.3]	0.139	31.5 [6.4]	31.3 [6.1]	0.301
Gestational age at delivery (weeks), mean [SD]	39.2 [1.8]	39.2 [1.8]	0.814	39.2 [1.8]	39.2 [1.7]	0.604
Multiparous, n (%)	4926 (43.9%)	1834 (45.2%)	0.167	5819 (44.4%)	941 (43.4%)	0.383
Multiple gestation, n (%)	184 (1.6%)	78 (1.9%)	0.238	218 (1.7%)	44 (2.0%)	0.224
Scoliosis n (%)	113 (1.0%)	40 (1.0%)	0.903	127 (1.0%)	26 (1.2%)	0.319
Analgesic use, n (%)	974 (8.7%)	355 (8.7%)	0.906	1148 (8.8%)	181 (8.3%)	0.528
Entonox use, n (%)	1469 (13.1%)	529 (13.0%)	0.915	1736 (13.2%)	262 (12.1%)	0.137
Induced Labour, n (%)	7895 (70.5%)	2817 (69.4%)	0.196	9234 (70.5%)	1478 (68.1%)	0.022*
Spontaneous vaginal delivery, n (%)	7891 (70.3%)	2842 (70%)	0.680	9155 (69.8%)	1578 (72.7%)	0.006*
Instrumental delivery, n (%)	1451 (12.9%)	562 (13.8%)	0.143	1777 (13.5%)	236 (10.9%)	<0.001*
Cesarean delivery, n (%)	1861 (16.6%)	652 (16.1%)	0.434	2163 (16.5%)	350 (16.1%)	0.672



Catheter replacement rate: 2.9%.
Incidence of epidural top ups: 14.2%

Table 4. Multivariable logistic regression predicting LEA catheter replacement			
Predictors	Odds Ratios	95% CI	<i>P</i> value
EPID (vs CSE)	1.18	0.91 – 1.52	0.206
CEI (vs PIEB)	1.14	0.86 – 1.52	0.372
↑ BMI	1.04	1.03 – 1.06	<0.001*
↑ Gestational age (weeks)	1.02	0.96 – 1.09	0.465
↓ Maternal age (years)	1.01	0.98 – 1.03	0.600
↑ Top-ups prior to replacement	2.04	1.79 – 2.34	<0.001*
↑ Withdrawals prior to replacement	3.62	2.49 – 5.26	<0.001*
Placement attempts	1.16	0.98 – 1.39	0.093
Multiple gestation	2.50	1.35 – 4.63	0.003*
Scoliosis	1.77	0.73 – 4.27	0.204
Induction of labour	1.10	0.88 – 1.37	0.401
Entonox use	1.05	0.77 – 1.44	0.735
Chronic pain medication	1.07	0.75 – 1.52	0.716
↑ Time from LEA placement to delivery (hours)	1.10	1.07 – 1.13	<0.001*
Parity	0.99	0.76 – 1.29	0.948

Table 5. Multivariable logistic regression predicting epidural intervention			
Predictors	Odds Ratios	95% CI	<i>P</i> value
EPID (vs CSE)	1.23	1.03 – 1.46	0.024*
CEI (vs PIEB)	1.34	1.10 – 1.64	0.004*
↑ BMI	1.03	1.02 – 1.05	<0.001*
↑ Gestational age (weeks)	1.04	0.99 – 1.09	0.108
↓ Maternal age (years)	1.00	0.99 – 1.02	0.858
↑ Placement Attempts	1.07	0.94 – 1.23	0.310
Multiple Gestation	1.32	0.77 – 2.25	0.312
Scoliosis	1.44	0.72 – 2.88	0.302
Induction of labour	1.19	1.02 – 1.39	0.028*
Entonox use	1.37	1.11 – 1.69	0.003*
Chronic pain modulating medication	1.47	1.16 – 1.87	0.001*
↑ Time from LEA placement to delivery (hours)	1.21	1.19 – 1.23	<0.001*
Parity	0.92	0.76 – 1.12	0.411

Conclusions

- PIEB not associated with lower rate of catheter replacement
- Catheter replacement rates at tertiary care center is 2.9%
 - Compares favorably with published studies
 - EPID replacement rates better than reported in literature
- CSE associated with lower rate of catheter replacement
 - Not maintained in logistic regression
- EPID and CEI both independent predictors of more epidural top-ups and more catheter withdrawals.
- No difference in Cesarean delivery rates among groups

