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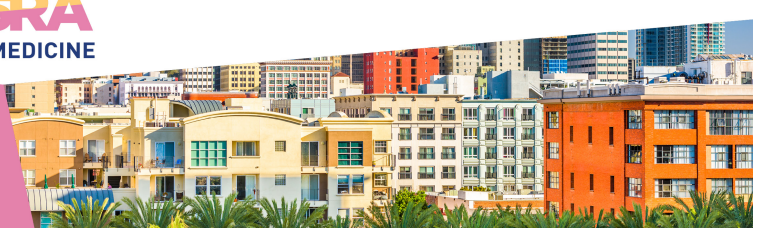

Abstract: 5432

Safety/QA/QI Projects

A Digital Nudge Increases Thoracic Epidural Confirmation Rates and Reduces Epidural Failure: A Quality Improvement Initiative

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Introduction

Thoracic epidural confirmation techniques remain underutilized despite published evidence for their improvement of epidural success rates[1,2]. Digital nudges can influence clinical decision making and are most effective when they seamlessly fit into existing workflows[3,4]. We explored if a digital nudge via an opt-in documentation process would increase epidural confirmation rates and improve the duration of thoracic epidural analgesia.

Materials and Methods

On October 25th 2021, we introduced an opt-in documentation option for thoracic epidural confirmation technique consisting of one additional line in our electronic medical record (EMR), with choices including saline column, electrical stimulation, test-dose sensory level, other, and none. There was no department-wide educational campaign or announcement about this documentation change. We assessed thoracic epidural confirmation technique documentation rates and thoracic epidural catheter duration between Oct 2020 and July 2023. The time interval between Oct 2020 and Oct 2021 was the pre-intervention period, Nov 2021 to May 2022 was the adaptation period, and June 2022 to July 2023 was the post-intervention period.

The primary outcome was the relative rate of documentation of thoracic epidural confirmation. Secondary outcome was thoracic epidural failure. Failure was defined as thoracic epidural duration less than or equal to 48 hours, a time chosen due to variations in intraoperative epidural use patterns and postoperative epidural activation protocols which affected earlier diagnosis of epidural failures. Differences in the primary outcome between the pre- and post-intervention periods were assessed using an unpaired, 2-tailed t-test. We estimated the association between the digital nudge and epidural failure using multivariate logistic regression, and assessed the association between the digital nudge and the epidural catheter duration with multivariate linear regression modeling.

Deidentified data was obtained from institutional EMR and clinical research repository. As this retrospective review is devoid of patient identifiable information, it is exempt from IRB review requirements as per Stanford University policy.

Results/Case Report

905 epidurals were identified in the pre (418) and post (483) intervention periods. Patient demographics in the pre- and post-intervention periods are compared in Table 1. Four epidurals were excluded due to patient death (1), catheter disconnection (2), and hospital discharge on the day of placement (1). The epidural confirmation documentation rate significantly increased from 46% to 82% (P < 0.001), seen in Figure 1.

73 (18%) and 51 (11%) epidural failures were observed in the pre and post intervention periods, respectively. The unadjusted odds ratio (OR) of epidural failure after the digital nudge intervention was 0.56 (95% CI: 0.38-0.82, P = 0.003), seen in Table 2. Adjustment for potential confounders sustained the reduced odds ratio of epidural failure in the post-intervention period (OR 0.58, 95% CI: 0.39-0.86, P = 0.007). After adjusting for confounders (age, gender, BMI, procedure location, staffing), epidural duration was on average 10 hours longer in the post-intervention period (P < 0.001), shown in Figure 2. In the post-intervention period, epidural duration was prolonged by 12 hours when a saline column confirmatory method was performed (P = 0.004). Confirmation by sensory level from a test dose alone prolonged the epidural duration by 9 hours, but this was not significant (P = 0.16). Based on the 24% unconfirmed thoracic epidural failure rate, the number needed to treat to prevent one epidural failure using any confirmatory method is 11 epidurals.

Discussion

The significantly increased rate of epidural confirmatory testing documentation and decreased odds of thoracic epidural failure support the utility of a digital nudge to influence anesthesiologists' practice. By implementing this nudge, our institution could potentially prevent about 10% of thoracic epidural failures per year.

We assumed that premature epidural removal indicates insufficient epidural analgesia, but acknowledge that epidural catheters may be removed early due to patient/surgeon preference, discharge requirements, and/or other unaccountable factors. We further did not distinguish between primary and secondary epidural failure, but our failure interval up to 48 hours offers a pragmatic approach to epidural assessment in light of various enhanced recovery protocols that employ epidural analgesia in various ways[5]. Data comparing combinations of confirmatory modalities was collected, but beyond the scope of this immediate analysis.

References

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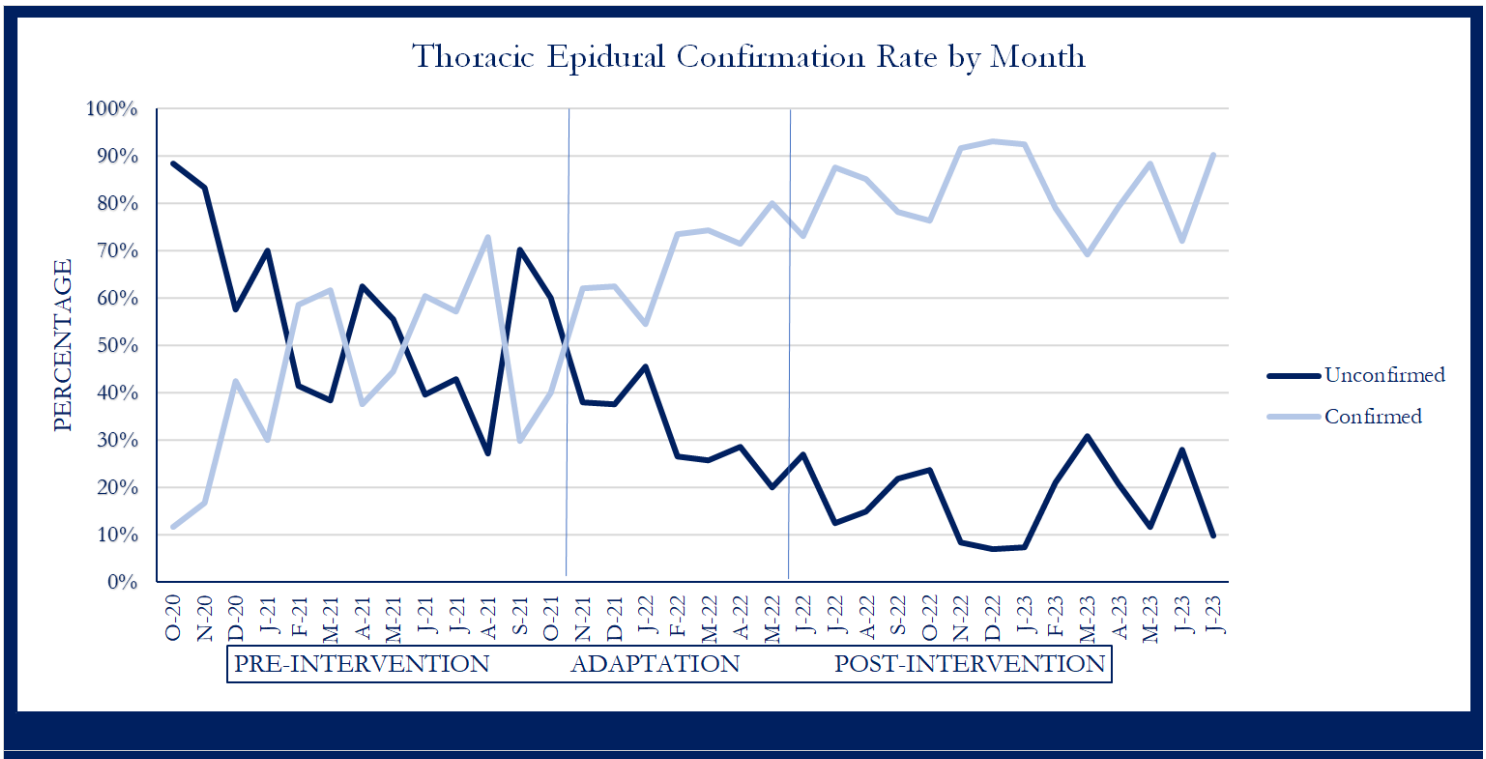
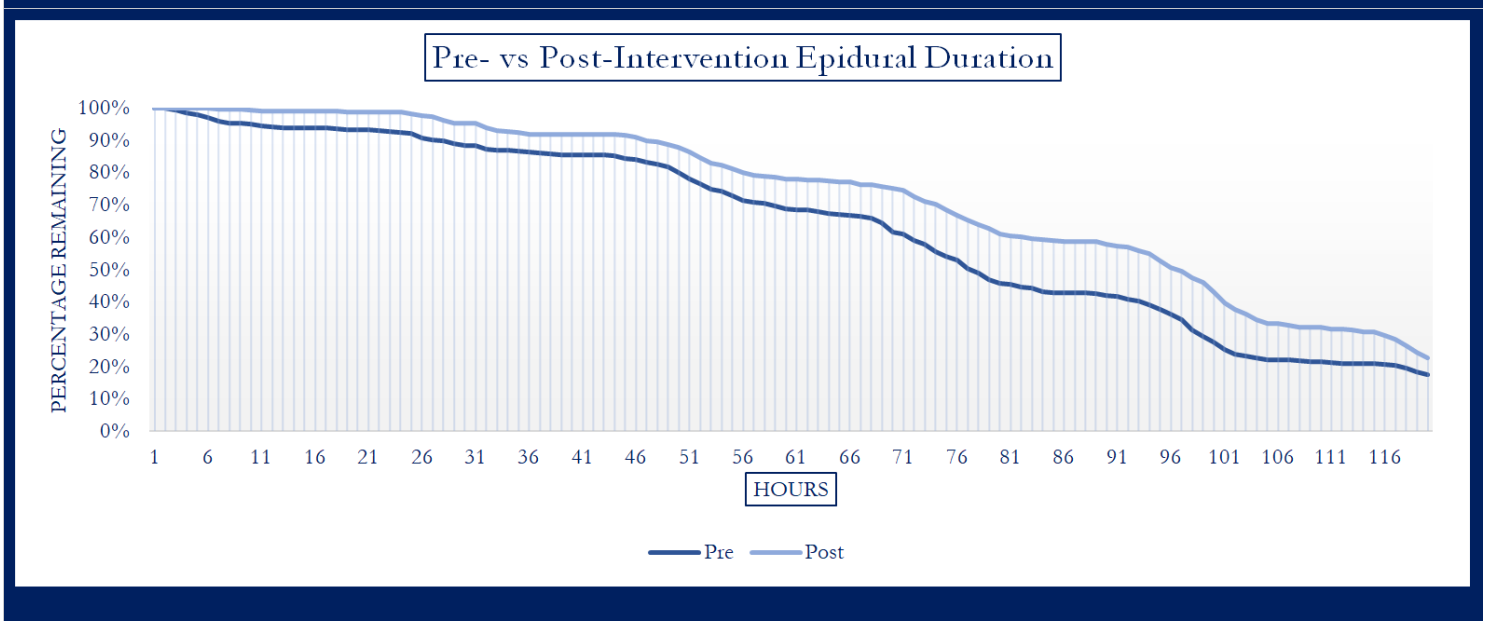
4. Harrison JD, Patel MS. Designing Nudges for Success in Health Care. AMA J Ethics. 2020;22(9):E796-801.
5. Tran DQ, Booysen K, Botha HJ. Primary failure of thoracic epidural analgesia: revisited. Regional Anesthesia & Pain Medicine. 2023:rapm-2023-105151.

Disclosures

No

Tables / Images





Category	Value	Category	Value	P-Value
Sum Total	1148			
Pre-Intervention Total	**418**	**Post-Intervention Total**	**483**	
Male	175	Male	214	0.46
Female	243	Female	269	
Mean Age	58.0	Mean Age	58.6	0.58
BMI < 30	314	BMI < 30	380	0.21
BMI ≥ 30	104	BMI ≥ 30	103	
Placed by regionalist	180	Placed by regionalist	293	< 0.001
Non-regionalist	238	Non-regionalist	190	
Placed in OR	194	Placed in OR	158	< 0.001
Out of OR	224	Out of OR	325	
Confirmed	192	Confirmed	396	< 0.001
Unconfirmed	226	Unconfirmed	87	
Saline Column	83	Saline Column	355	< 0.001
Electrical Stimulation	60	Electrical Stimulation	88	0.14
Test-Dose	143	Test-Dose	160	0.73
Confirmed Once	122	Confirmed Once	220	< 0.001
Confirmed Twice	46	Confirmed Twice	146	< 0.001
Confirmed Thrice	24	Confirmed Thrice	30	0.89

Category	OR	95% CI	P-Value
Post-Intervention, Unadjusted	0.56	0.38-0.82	0.003
Post-Intervention, Adjusted	0.58	0.39-0.86	0.007