Reducing Labor Epidural Failure through Targeted Interventions: Quality Improvement Initiative

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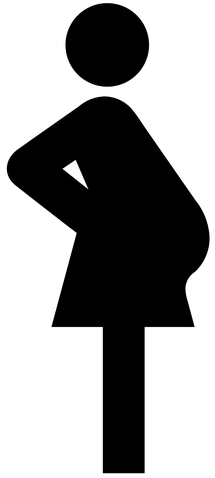
Background & Purpose



Background

Epidural analgesia gold standard for pain management in laboring patients

Failed Epidural (FE) can lead to physical & psychological risks

- Inadequate pain control: ↑ maternal stress, altered uteroplacental perfusion, delayed labor progression, ↑ rate of emergent CD
- Unmanaged labor pain associated: ↓maternal satisfaction, ↑ post-traumatic stress symptoms, ↑ postpartum depression

Reported epidural failure range 8-12% (Berger et al., 2022; Ibrahim & Vadhera, 2023)

Reduced epidural effectiveness in high BMI patients (Gonzalez-Tascon et al, 2021)

- Technical difficulties in placement
- Unpredictable spread of local anesthetic

Purpose

Reduce failed epidural analgesia (FEA) for labor by identifying local risk factors and implementing targeted practice change

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Project Design & Methods

Project Design:

- **Quality improvement project using iterative Plan-Do-Study-Act** (PDSA)
- Pre- and post-intervention retrospective chart reviews

- 800-bed academic Level IV Maternal Care Center
- Supports > 3,000 deliveries annually
- Staffed by anesthesia care team model

Baseline analysis:

- Review of **200 labor epidural cases**
- **Identified predictors** of **failed epidural analgesia** (FEA)
  - Collected 73 data points per case (patient, provider, procedure & delivery characteristics)

Targeted interventions implemented:

- **Dural puncture epidural** (DPE) technique for higher-risk FE
- Selective **pre-procedural neuraxial ultrasound** for FE risk
- Structured **EMR documentation template** for reassessment
- Standardized **replacement protocol** after 2–3 ineffective boluses

Post– intervention evaluation:

- 118 cases reviewed
- Compared Failed epidural (48): Successful Epidural (64)

Statistical analysis:

- Descriptive statistics
- Chi-square and Fisher's exact tests ($\alpha = 0.5$)

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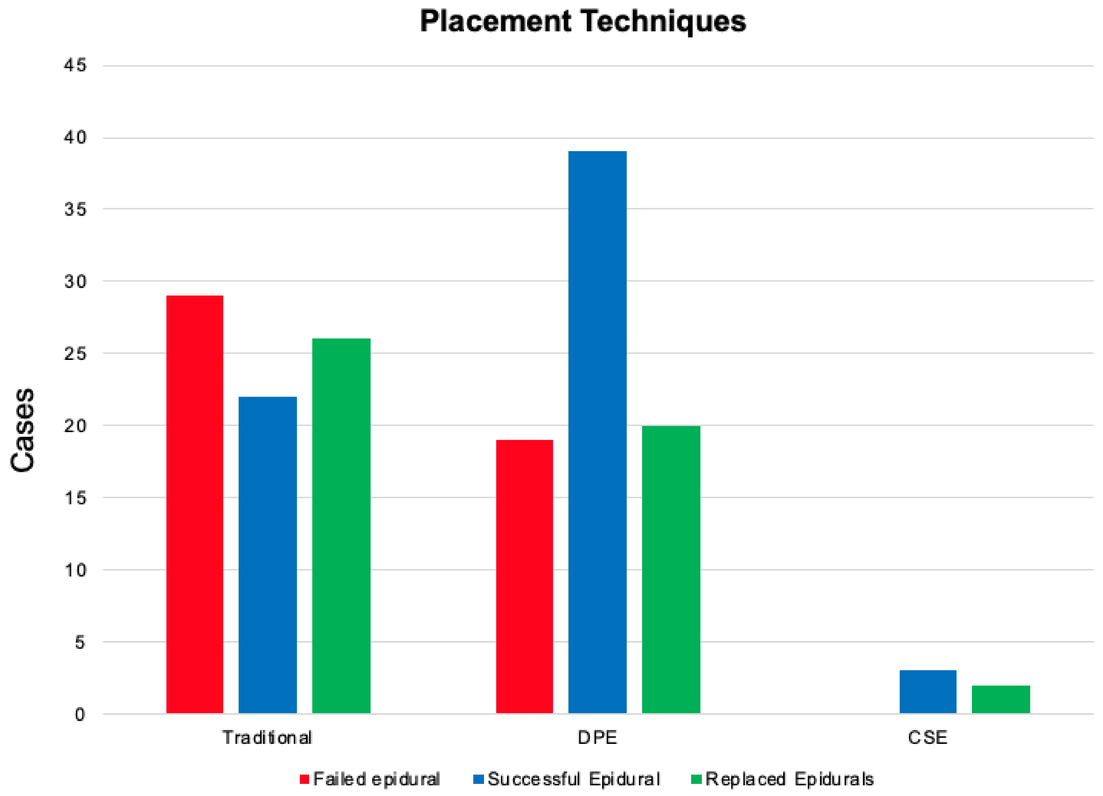
Results

Cycle 1:

- Baseline FEA was 15%
  - Surpassing the reported national average of 8-12%
- Identified obesity (BMI > 35 kg/m²), chorioamnionitis, gestational hypertension, and frequent epidural boluses as significant predictors of FEA ($p < .05$)

Cycle 2

- Overall FEA rate decreased 7.3%
- DPE use associated with lower epidural failure rates (p=0.0126)
  - Failed Epidurals: Traditional 29 (60%), DPE 19 (40%)
  - Successful Epidurals: Traditional 22 (34%), DPE 39 (61%), CSE 3 (4.7%)
- EMR-driven reassessment & documentation improved
- Neuraxial ultrasound adoption was limited but appeared beneficial for anticipated difficult placements



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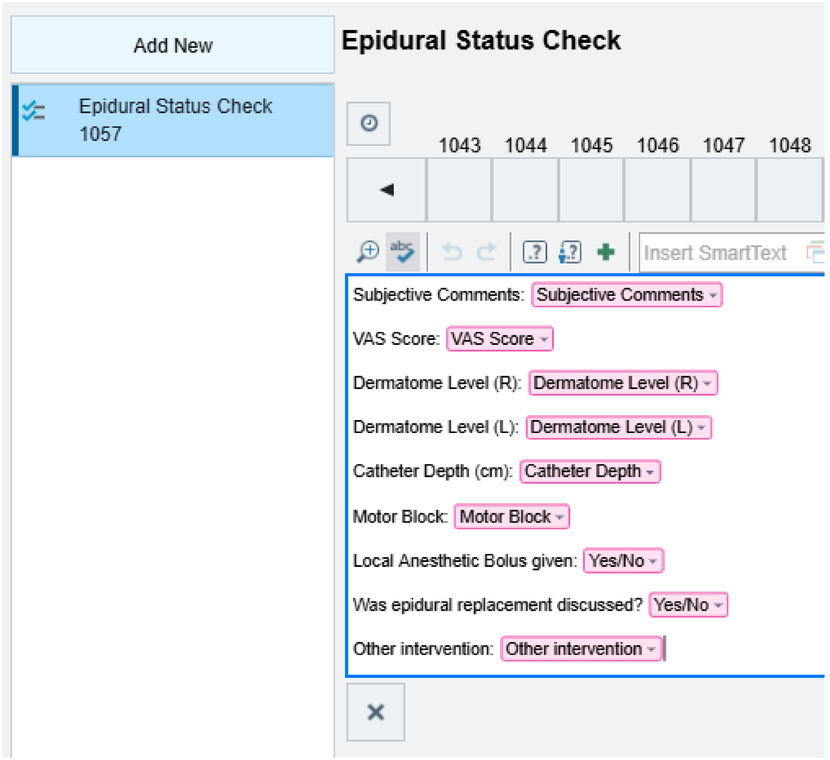
Conclusion & Discussion

- Identified **key factors influencing epidural failure**
- **DPE technique** demonstrated a reduction in FEA rates
- **Standardized EMR documentation**
  - Improved data accuracy
  - Reduces bias
  - Supports equitable decision-making
- Standard **replacement protocol**
  - Replacement encouraged after two separate epidural bolus occasions
- Sustained improvement requires **ongoing PDSA cycles**
  - Continued data collection
  - Provider adherence to documentation protocols
  - Reinforcement of evidence-based practice
- Future evaluations should **further examine preprocedural neuraxial ultrasound**



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