Peri-operative Risk Factors for Persistent Opioid Use following Lower Extremity Amputations

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Background

- Lower extremity amputation (LEA) carries a high risk of persistent opioid use (POU), up to ~23% in opioid-naïve patients
- Continuous nerve catheters reduce opioid use ~40% in the first 72 hours postoperatively
- Regional anesthesia's effect on long-term opioid outcomes after LEA remains partially uncharacterized

~200,000
LEAs performed annually in the U.S.

up to 23%
of opioid-naïve patients develop POU after LEA

Note: Our cohort is not restricted to opioid-naïve patients

Objective & Hypothesis

To identify perioperative risk factors, emphasizing regional anesthesia technique and catheter duration, associated with POU after LEA, hypothesizing that longer catheter dwell time predicts lower odds of POU.

Methods

- Retrospective cohort, single academic center (University of Maryland Medical System), 2017–2024
- Adults undergoing first transfemoral/transtibial LEA; excluded early death or incomplete prescription records
- POU defined as an active opioid prescription at 90–120 days (3 mo) and 150–180 days (6 mo) postoperatively
- Full-cohort model adjusted for age, BMI, sex, amputation etiology and level, preoperative opioid use (90-day PDMP lookback), psychiatric comorbidity, diabetes, and opioid use disorder
- Catheter-recipient subgroup: logistic regression of duration vs. POU; ROC analysis (Youden's J) identified the optimal duration threshold

Statistical Analysis

Mixed-effects logistic regression (random intercept per subject) modeled POU at 3 and 6 months jointly, adjusted for demographic and clinical covariates. Two-tailed $\alpha = 0.05$.

Table 1. Cohort Characteristics (N = 476)

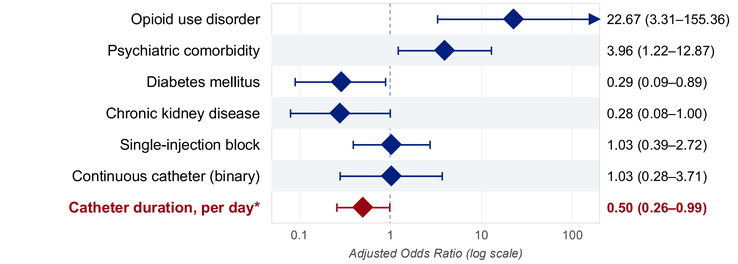
Age, mean ± SD	56.9 ± 14.7 y	**Diabetes mellitus**	51.5%
Male sex	69.5%	**Psychiatric comorbidity**	31.5%
Opioid use disorder	9.5%	**Preop opioid use**	35.3%
Catheter duration, median	4.0 (3.0–5.0) d	**BMI, mean ± SD**	28.3 ± 8.0

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Results

- POU occurred in 53.6% of patients at 3 months and 40.0% at 6 months (N = 476), declining significantly over time (aOR 0.25, 95% CI 0.15–0.43)
- Our cohort had higher rates of POU, likely due to the premorbid conditions of our cohort (Table 2)
- Binary regional anesthesia exposure was not associated with POU (single-injection P = 0.553; catheter placement P = 0.510)

Figure 1. Adjusted Predictors of Persistent Opioid Use



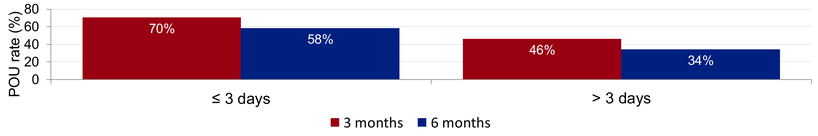
**Catheter duration modeled separately among 79 catheter recipients (per-day aOR derived from the per-SD model, SD ≈ 1.7 days). All other rows from the full-cohort model (N = 476). Opioid use disorder's upper CI (155.36) exceeds the plotted range — arrow indicates truncation.*

Catheter Duration Linked to Lower POU

aOR 0.50
per additional catheter day (95% CI 0.26–0.99)

3 days
Youden-optimal duration threshold on ROC analysis

POU Rate by Catheter Duration



Among catheter recipients (n = 79), longer duration independently reduced odds of POU (aOR 0.50 per day, 95% CI 0.26–0.99; P = 0.046).

Table 2. Cohort Characteristics by POU Status at 3 Months

Characteristic	POU+ (n=223)	POU− (n=193)	P
Age, mean ± SD	54.9 ± 14.1 y	58.4 ± 15.1 y	0.015
Psychiatric comorbidity	39.5%	22.8%	<0.001
Opioid use disorder	13.5%	3.1%	<0.001
Diabetes mellitus	45.7%	58.0%	0.016
Chronic kidney disease	20.6%	30.1%	0.036
Catheter duration, median (IQR)	3.0 (2.0–5.0) d	4.0 (3.0–5.0) d	0.015

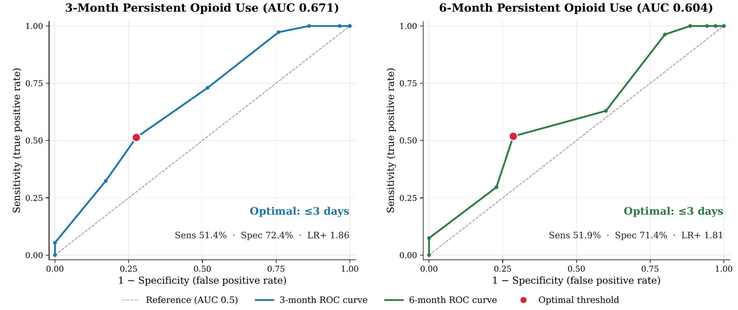
Conclusions

1. Catheter duration, *not mere placement*, was associated with reduced POU; duration-based protocols, not binary block/catheter-yes-no metrics, are needed to translate regional anesthesia into less chronic opioid use, with a ≥3-day dwell time a candidate target for prospective evaluation

2. Opioid use disorder and psychiatric comorbidity were the strongest predictors of POU and warrant early, targeted perioperative pain planning

3. Findings are hypothesis-generating from a retrospective, single-center cohort. Prospective, multicenter (ideally randomized) studies are needed to validate catheter-duration thresholds and confirm causality before changing practice

Figure 2. ROC Curves for Catheter Duration as a Predictor of POU



Youden's J identified ≤3 days as the optimal duration threshold at both timepoints (AUC 0.67 at 3 months; 0.60 at 6 months) — a single-center, hypothesis-generating result that warrants multicenter confirmation.

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