Patient and treatment factors associated with opioid usage after tibial shaft fractures

Daniel Cunningham[1], Mark Gage[1]
[1]Duke University Medical Center, **Durham**, NC, USA

INTRODUCTION

- US within an epidemic of opioid misuse and abuse [1]

- Orthopaedic surgeons are 3rd highest prescibers by volume [2]

- Orthopaedic trauma patients are significantly more likely to use opiates compared to general population [3]

- High in-hospital opioid usage is associated with lower patient satisfaction with pain management [4,5]

- There is no established baseline of inpatient narcotic consumption after tibial shaft fractures

HYPOTHESES

- Pre-operative and treatment factors impact post-operative opioid consumption

METHODS

Study description

- **Single-institution retrospective cohort study**
- **Evaluated predictors of in-hospital opioid usage among patients undergoing operative treatment of tibial shaft fractures (CPT 27758, 27759) between 2013 and 2018**
- **Baseline patient and operative factors along with opioid consumption determined through review of records and DEDUCE**
- **Patient comorbidities determined through ICD-9/10 codes as determined by Charlson-Deyo and Elixhauser**
- **Opioid consumption converted to daily oral morphine equivalent (OME) doses**
- **Baseline model of opioid consumption (daily OME's) incorporated age, sex, race, body mass index (BMI), smoking, Charlson-Deyo comorbidity subscore, and local regional anesthesia usage**
- **Individual comorbidies with 10% prevalence assessed for association with outcomes while incorporated with baseline model factors**
- **Final model included baseline model and any comorbidies associated with outcome**

RESULTS

Table 1: Baseline patient and treatment factors

Patient and treatment factors	Mean (SD) or proportion (%)
Opioid consumption (OME's)	40.5 (31.4)
Age (years)	43.7 (19.3)
Female sex	175 / 491 (35.6%)
Caucasian race	244 / 491 (49.7%)
BMI (kg/m2)	28.5 (7.1)
Current smoker	121 / 488 (24.8%)
Charlson-Deyo comorbidity sub-score	1.1 (2.3)
Local regional anesthesia	30 / 491 (6.1%)
Hypertension	107 / 491 (21.8%)
Depression or psychosis	102 / 491 (20.8%)
Cardiac arrhythmia	94 / 491 (19.1%)
Fluid and electrolyte disorders	83 / 491 (16.9%)
Chronic obstructive pulmonary disease	65 / 491 (13.2%)
Diabetes mellitus	62 / 491 (12.6%)
Deficiency anemia	62 / 491 (12.6%)
Obesity	58 / 491 (11.8%)
Peripheral vascular disease	51 / 491 (10.4%)
Drug abuse	49 / 491 (10%)

Table 2: Patient and treatment factors associated with opioid usage per day from date of surgery to discharge. Individual comorbidities were tested in multivariable models that incorporated age, sex, race, BMI, smoking, Charlson-Deyo comorbidity subscore, and LRA. P-values less than 0.05 in multivariable models were considered significantly associated with the outcome.

Patient and treatment factors	Mean adjusted additional OME's (95% CI, p-value)
Opioid consumption (OME's)	n/a
Age (years)	-0.3 / unit (-0.5, -0.1; <0.001)
Female sex	-8 (-13.8, -2.2; 0.007)
Caucasian race	4 (-1.5, 9.5; 0.152)
BMI (kg/m2)	0.5 / unit (0.1, 0.9; 0.012)
Current smoker	16.3 (9.8, 22.8; <0.001)
Charlson-Deyo comorbidity sub-score	-0.3 / unit (-1.6, 1; 0.66)
Local regional anesthesia	-13.3 (-24.3, -2.2; 0.019)
Hypertension	-1.3 (-9.9, 7.4; 0.77)
Depression or psychosis	8.6 (1.3, 15.8; 0.02)
Cardiac arrhythmia	-2 (-9.5, 5.5; 0.61)
Fluid and electrolyte disorders	-1.8 (-10.6, 7; 0.69)
Chronic obstructive pulmonary disease	6.5 (-2.4, 15.5; 0.151)
Diabetes mellitus	2.3 (-7.6, 12.3; 0.65)
Deficiency anemia	0.1 (-9.7, 9.8; 0.99)
Obesity	3.1 (-6.6, 12.8; 0.53)
Peripheral vascular disease	-9.4 (-20.5, 1.6; 0.094)
Drug abuse	3.8 (-5.6, 13.3; 0.43)

CONCLUSIONS

- Patients used a mean of 40.5 OME's per day while hospitalized for tibial shaft fracture surgery (approximately 20 mg oxycodone)

- Patient factors were associated with increased usage

  - Young age at 0.3 additional OME's per day per year younger
  - Male sex at 8 additional OME's per day
  - Increased BMI at 0.5 additional OME's per day per unit increase in BMI
  - Smoking at 16.3 additional OME's per day increase
  - Psychiatric diseases at 8.3 additional OME's per day increase

- Treatment factors also associated with increased usage

  - Lack of local regional anesthesia usage at 13.3 additional OME's per day increase

LIMITATIONS

- Did not control for additional injury specifics such as fracture severity, injury mechanism, acuity, location along shaft, and fracture fixation strategy

- Did not control for additional injuries which may impact overall usage

- Only evaluates inpatient usage

REFERENCES

[1] Okie NEJM 2010; [2] Morris JAAOS 2015; [3] Holman JBJS 2013; [4] Bot CORR 2014; [5] Helmerhorst JBJS 2014

ACKNOWLEDGMENTS