Postgraduate Training Year Predicts Operative Time and Outpatient Surgical Care Readmission?

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Background

- Postgraduate training year (PGY) is commonly used to guide intraoperative teaching but seldom considered in planning operative time and postoperative care.
- Existing studies that investigate the effect of resident PGY on surgical outcomes always assume PGY isa completely independent variable, which is often not true in real data., especially in the field of machine learning (ML) and artificial intelligence (AI).

Objective

- We hypothesize that PGY strongly predicts operative time (OT) and 30-day readmission (30R) if considering it as a group feature together with procedure type (PT), case type (CT), robotic-or-not (RON), diagnosis-related groups (DRG), and patient socioeconomic status (SES) assessed by zip code.

Methods

- We extracted PGY, OT, 30R, RON, DRG, SES, PT, and CT from six open/laparoscopic/robotic procedures: Cholecystectomy (CH), Colectomy (CO), Inguinal Hernia (IH), Hysterectomy (HY), Nephrectomy (NE), and Prostatectomy (PR).
- Only 07/2016-06/2020 cases were included to avoid COVID-related confounders.
- Descriptive statistics and boosted tree predictive model with independent resampling were applied to examine the predictor total effect (TE).

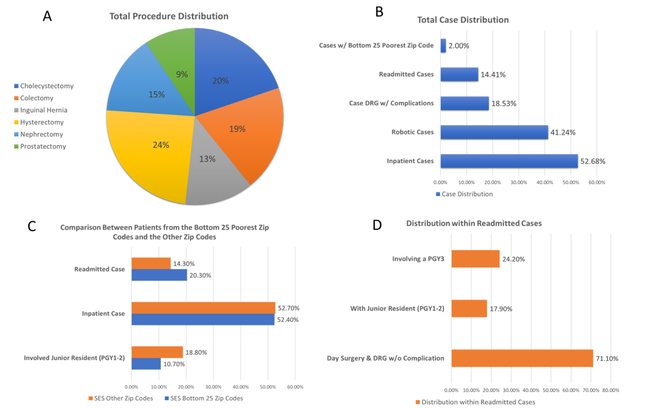


Fig. 1 A) Procedure Distribution, B) Case Distribution, C) Comparison upon SES, D) Readmitted Cases Distribution

Results

- We included 13,570 cases involving a resident/fellow (Fig.1). The median OT was 129 (IQR 87, 191) minutes.
- Overall, PGY had minimal correlation with OT (r=0.026, p=0.003) and did not affect 30R ([OR] 0.99, 95%CI 0.94-1.04) in outpatient cases.
- However, when considering it as a group feature together with other variables,
- PGY had the strongest predictor TE for OT in all procedures (CO 0.92, NE 0.86, IH 0.83, HY 0.80, CH 0.74, PR 0.70).
- PGY was also the strongest predictor (0.71) for 30R in outpatient cases, followed by PT (0.68), RON (0.57), DRG (0.48) and SES (0.12).
- SES affected overall readmission ([OR]1.72, 95%CI 1.28-2.30).

Conclusion

- Our findings suggest resident PGY may demonstrate predictive value for operative time and patient outcome of cases with resident involvement.
- The predictive value of PGY as a group feature differs from treating it as a completely independent variable.
- Future AI/ML algorithms are needed to further investigate the potential use of PGY to optimize the planning of teaching and surgical care.

Reference

- Zhang Z, Zhao Y, Canes A, etc written on behalf of AME Big-Data Clinical Trial Collaborative Group. Predictive analytics with gradient boosting in clinical medicine. Ann Transl Med. 2019 Apr;7(7):152. doi: 10.21037/atm.2019.03.29. PMID: 31157273; PMCID: PMC6511546.