Orthopedic Surgery Referral Pattern Investigation in Regard to PAD and CLI

Fahad Qureshi[1], Jeremy Provance[1]

1. University of Missouri-Kansas City School of Medicine

Introduction

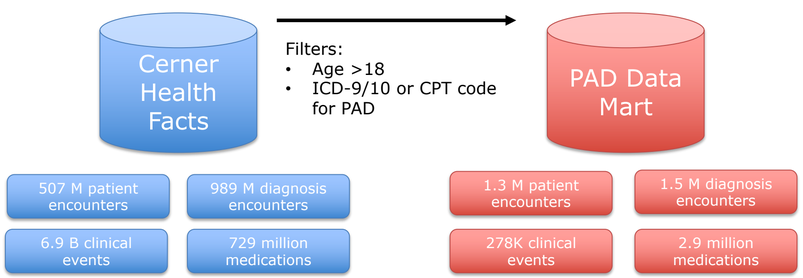
- Peripheral artery disease (PAD impacts more than 8 million people in the U.S. and over 202 million people globally
- PAD occurs when atherosclerotic plaque accumulates in the lower extremities and results in reduced blood flow to the individual's extremities causing pain referred to as claudication. In more severe PAD, critical limb ischemia (CLI), patients experience pain when resting, open sores, infections, and gangrene
- Multiple providers can treat PAD and CLI, such as cardiologists, general practitioners, and surgeons, and this can affect the treatment patients receive

Aims

In this work, we aimed to 1) Document characteristics of PAD patient encounters with surgeons versus non-surgeons, and 2) Identify patient and site predictors for whether a patient is seen by a surgeon

Methods

- The Cerner Health Fact electronic medical record data provides 63 million unique patients seen at 600 Cerner health care sites across the US between years 2000 and 2018. De-identified patient level data can be queried for demographics, diagnoses, medications, procedures, and visit site characteristics for analysis
- Standardized differences were computed to understand differences in surgeon versus non-surgeon encounters
- Odds ratios were generated using logistic regression modeling to understand predictors of seeing a surgeon



Results

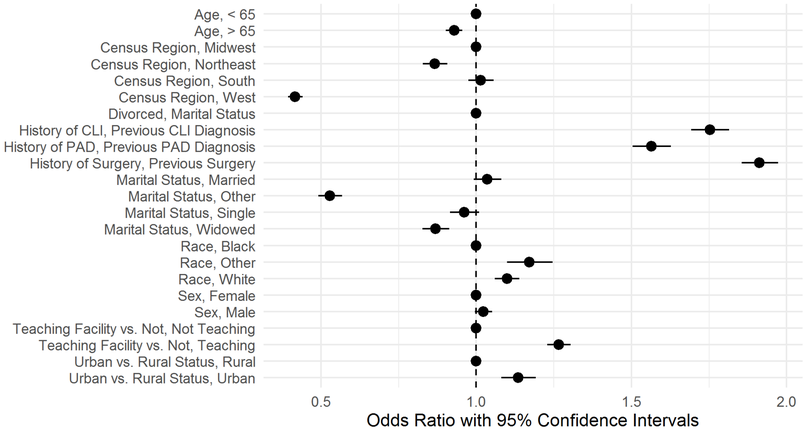
- Patient encounters with heart failure, coronary artery disease, and chronic kidney disease were less often associated with seeing a surgeon (Table 1)
- Patients with chronic wounds and critical limb ischemia were more often associated with seeing a surgeon. Patients in Midwest and West census regions were more often associated with seeing a surgeon during their encounter (Table 1)
- Predictors of seeing a surgeon during a PAD patient's encounter were a history of PAD, CLI, or PAD-related surgery (Figure 1)
- Being seen at an urban and teaching facility was predictive of being more likely to see a surgeon (Figure 1)

Table 1. Patient and Site Characteristics for Surgeon and Non-Surgeon Provider Encounters ranked by decreasing Standardized Differences

Characteristic	Surgeon Encounter	Non-Surgeon Encounter	Standardized Difference
Heart Failure	263865 (82.6)	84724 (91.5)	0.27
Census Region, Midwest	81955 (25.6)	16499 (17.8)	0.257
Census Region, Northeast	52217 (16.3)	20704 (22.4)	
Census Region, South	157324 (49.2)	50098 (54.1)	
Census Region, West	28128 (8.8)	5265 (5.7)	
Coronary Artery Disease	197405 (61.8)	67258 (72.7)	0.234
Chronic Ischemia Wound	278448 (87.1)	73220 (79.1)	0.215
Critical Limb Ischemia	287935 (90.1)	76690 (82.8)	0.213
Chronic Kidney Disease	260000 (81.3)	81933 (88.5)	0.201
Acute Kidney Failure	292239 (91.4)	88955 (96.1)	0.194
Dyslipidemia	215872 (67.5)	70573 (76.2)	0.194
Chronic Lung Disease	269892 (84.4)	83658 (90.4)	0.18
Atrial Fibrillation	277984 (87.0)	85209 (92.1)	0.166
Hypertension	189503 (59.3)	62058 (67.0)	0.161

Results

Figure 1. Odds Ratios with 95% Confidence Intervals for Predictors of Seeing a Surgeon During an Encounter after a Peripheral Artery Disease Diagnosis



Conclusions

- We observed significant differences in the provider type seen based on characteristics of the patient and site at each encounter
- Systematic differences exist in predictors of a patient with PAD seeing a surgeon for example a patient with a history of surgeries was more likely to get surgery associated as a result of this illness
- Further research must be done to better understand the reasons behind the patterns that we uncovered

References:

1. Hyder O, Dodson RM, Nathan H, et al. Referral patterns and treatment choices for patients with hepatocellular carcinoma: a United States population-based study. *J Am Coll Surg.* 2013;217(5):896-906.
2. "Peripheral Artery Disease (PAD)." *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 17 July 2018, www.mayoclinic.org/diseases-conditions/peripheral-artery-disease/symptoms-causes/syc-20350557.
3. Uccioli, Luigi, et al. "Critical limb ischemia: current challenges and future prospects." *Vascular health and risk management* 14 (2018): 63.
4. Wennberg, P. W. (2013). Approach to the patient with peripheral arterial disease. *Circulation*, *128*(20).

Disclosures:

- This research was in part funded through a Sarah Morrison Student Research Award granted by the University of Missouri-Kansas City School of Medicine Office of Research Administration. The views, statements, and opinions in this work are solely the responsibility of the authors and do not necessarily represent the views of the University of Missouri-Kansas City or its affiliates.