

The Patient Referral Network – Understanding Where Surgical Volume Comes From in a Complex Referral System

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Introduction

Prior studies have evaluated proportions of patients referred by general practitioners (GP) to subspecialty providers. However, few studies have evaluated referral patterns of patients to spine surgeons and none have determined the likelihood of surgery from referral sources. This study aimed to identify the common referral patterns at a large, tertiary care, academic, medical center that led to spine surgery.

Methods

This study is a retrospective cohort study, that examined patients referred to one of five spinal surgeons in the Cleveland Clinic Center for Spine Health for the first time from 2011-2016. Surgical status, demographics, and referral source were gathered for each patient.

Descriptive Results

Of 2,448 new visits, 1487 (60.7%) met inclusion criteria. For all referral sources, 44.9% underwent surgery. 55.2% of referrals were self-referrals, while 44.8% were referred by a physician. The most common referral specialty categories were GP (49.8%), Interventionalists (19.1%), Surgery (12.5%), and Neurology (10.7%), as shown in Figure 1. All demographic frequencies for physician and self-referred patients is listed in Table 1.

Table 1: Demographic Data Frequencies for Referral Sources

	MD (666)	Self (821)
From Ohio	79.88% (520)	71.77% (572)
White	90.18% (588)	89.86% (727)
Female	49.85% (332)	46.41% (381)
Married	61.50% (401)	68.73% (556)
Income >54K	35.15% (226)	46.36% (363)
Smoking	14.89% (91)	14.96% (111)
Alcohol	48.98% (287)	57.31% (404)
Drugs	3.61% (17)	3.74% (19)
Age >60	69.97% (466)	42.87% (352)
BMI >30	43.79% (134)	36.39% (151)
Cancer	11.88% (79)	7.68% (63)
CRF	1.50% (10)	0.85% (7)
Diabetes	9.92% (66)	8.41% (69)
Depression	6.77% (45)	5.24% (43)
CAD	5.71% (38)	3.42% (28)
Hypertension	23.01% (153)	13.42% (110)
Stroke	2.26% (15)	1.83% (15)
Anti-depressants	19.10% (127)	15.73% (129)
EQ5D < 57	40.37% (262)	36.61% (298)
PHQ-9 <=10	79.58% (491)	79.63% (610)
PDQ < 76	45.75% (285)	49.74% (385)

Surgical Status Results

Self-referred patients were less likely than physician-referred patients to undergo surgery (OR 0.48, 95% CI 0.39-0.59, $p < 0.0001$). Referrals from Interventionalists (OR 1.64, 95% CI 1.09-2.45, $p = 0.0163$) and Neurology (OR 2.02, 95% CI 1.19-3.44, $p < 0.0082$) were more likely to lead to surgery. Those referred by GP were less likely to undergo surgery (OR 0.55, 95% CI 0.40-0.76, $p = 0.0003$), as shown in Figure 2. After accounting for covariates, self-referred (OR 0.68, 95% CI 0.48-0.96, $p = 0.0293$), GP (OR 0.56, 95% CI 0.38-0.83, $p = 0.0036$), physician-referred (OR 1.48, 95% CI 1.04-2.10, $p = 0.0293$), and Neurology (OR 1.75, 95% CI 1.01-3.05, $p = 0.0477$) were predictors of undergoing surgery (Table 2).

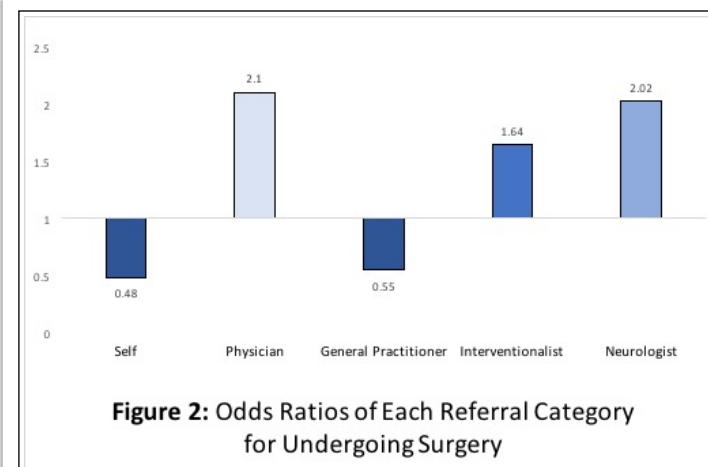


Figure 2: Odds Ratios of Each Referral Category for Undergoing Surgery

Table 2: Predictors of Undergoing Surgery After Accounting for Demographic Differences

Referral	p value	OR	CI
Self	0.0293	0.6761	0.4754 to 0.9614
MD	0.0293	1.4789	1.0401 to 2.103
General Practitioners	0.0036	0.5616	0.3809 to 0.8278
Interventionalist	0.0582	1.5296	0.9809 to 2.3853
Neurology	0.0477	1.7498	1.0057 to 3.0446

Conclusions

This study found self-referred and GP-referred patients underwent surgery less often than Neurology or Interventionalist referred patients. This information may help spine surgeons evaluate referral patterns to optimize patient throughput and maximize provider efficiency.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Discuss the trends in referral provider sources for spine surgeons presented 2) Discuss differences in undergoing surgery based on referral source and provider specialty

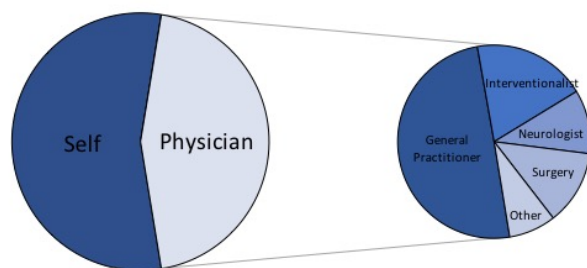


Figure 1: Referral Source Proportions