



Analysis of Outpatient Adherence in 45,237 Patients Referred by an Emergency Department to Surgical Clinics

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Accepted: 8 October 2022

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Abstract

Introduction This study examines referral patterns to surgical clinics from the emergency department and the impact of sociodemographic factors on adherence.

Methods Patients from 2017 to 2021 were identified who had a referral placed to surgical specialties from the ED. The primary outcome was the proportion of patients who had a referral to surgery placed during an ED visit but who showed up to surgery clinic visit within 60 days of referral placement. Univariate and multivariate analysis was performed.

Results Referrals were made for 45,237 patients overall and 4130 for general surgery specifically. 44% showed up to general surgery clinic visit. In univariate and multivariate analysis, those who showed up to clinic were older, tended to be female, had a lower social economic status, had Medicaid or Medicare insurance and had more comorbidities compared to those who did not show up. Asians and Hispanics were more likely to show up to clinic compared to Whites.

Conclusions Assigning navigators in the ED to follow-up with patients who are younger and healthier, with private insurances who have existing PCPs to ensure they follow up as advised is a potential targeted intervention to improve clinic adherence.

Introduction

Montefiore Medical Center serves 500,000 residents of the Bronx and adjacent Westchester County. The Bronx is one of the poorest urban counties in the nation, where one-quarter of the adult population is uninsured and carry the burdens of disease associated with poverty: obesity, hypertension, cardiovascular disease, asthma, hepatitis C, and HIV [1]. The emergency department (ED), one of the

busiest in the nation, sees on average 300,000 ED visits annually [2].

According to the U.S.A Centers for Disease Control and Prevention, there were approximately 130 million ED visits in 2018 nationwide [3]. 67% of these visits were asked either to return, referred to a physician or for clinic. Patients who visit the emergency department usually follow two paths: they are either discharged from the ED or they are admitted to the hospital. When discharged, these patients are instructed to follow-up with their primary care physician (PCP) or they are referred to other specialty clinics [4]. These referrals are an important component of medical care, and specifically delayed surgical care may be costly and dangerous. Use of the ED in this regard is a challenge facing any safety-net hospital, and the high ED volume at Montefiore makes this particularly challenging.

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Examining referral patterns may provide insight into ways to reduce delays in care. However, there are few studies which investigated the attendance rate after a referral from the ED, especially regarding general surgery [5, 6].

The aim of this study was to examine the referral patterns to surgical clinics, and general surgery specifically, from the emergency department at a tertiary academic center and the impact of sociodemographic factors on adherence to referral appointments in order to highlight areas for improvement.

Methods

Study design

The hospital's clinical database, Clinical Looking Glass (CLG)TM was used to identify a cohort of patients who had a referral placed to specific surgical specialties during an ED visit encounter between the years 2017–2021, at Montefiore Medical Center. The time period from 2020 to 2021 was specified as a subset group to include a cohort affected by the Covid-19 pandemic. The surgical specialties included in the cohort included general surgery, pediatric surgery, vascular surgery, plastic surgery, otolaryngology surgery and orthopedic surgery, totaling 45,237 patients. The primary outcome was the proportion of patients who had a referral to surgery placed during an ED visit but who showed up to surgery clinic visit within 60 days of referral placement. Analysis was also performed for the year 2020 to 2021, to assess any significant differences the Covid-19 pandemic may have had on outcomes.

Data collection

Demographic, socio-economic and comorbidity data from CLG were extracted and included race (white vs non-white), gender (male vs female), age, insurance type, diagnosis, Charlson comorbidity index (CCI) scores, hospitalizations, socio-economic status (SES). The Charlson score was calculated from comorbidities prior to the ED visit in which the referral to surgery was placed. A measure of SES was derived from census block to which each subject's home address belonged and was normalized to New York State average using census data. Diagnoses for the ED visit were grouped into larger, broader categories. Data was also extracted for the year 2020 to 2021, to assess any significant differences the Covid-19 pandemic may have had on outcomes.

Statistics

Categorical values were reported as frequencies and percentages. Continuous variables were reported as mean and standard deviation for continuous variables whose distribution approximated normality and median and range for those with skewed distributions. Chi-square and Fisher's Exact tests were used for categorical variables. T-tests and Wilcoxon rank-sum tests were used for continuous variables. Logistic regression was used to identify factors associated with showing up to a surgery clinic after ED visit. All factors with $p < 0.20$ after the univariate analysis were included in the regression. A backward stepwise procedure was used. Variables with $p < 0.05$ were retained in the final model. The data were analyzed using the SAS v9.4. This study was approved by the Institutional Review Board and all the Health Insurance Portability and Accountability Act (HIPAA) compliant mechanisms were followed.

Results

Between 2017 to 2021, referrals to surgical specialties were made for 45,237 patients, and 4130 patients for general surgery specifically from the ED. Table 1 gives the breakdown of referrals and clinic visits for other surgical specialties at the tertiary care center and excludes 2020, which is analyzed separately given the impact of Covid-19 pandemic during this time. For general surgery, median age was 42 (18–100). 51% of the patients were Hispanic, 33% Black and 7% White. The median SES was -3 (-10 to 4). 42% of the patients were on Medicaid or Medicare insurance plans. The most common comorbidity was cancer (15.2%), followed by Diabetes (12.6%). The median Charlson comorbidity index was 0 (0 to 18).

There was an existing PCP for 2962 patients (72%), while a new PCP was assigned at the time of the ED visit for 16.7%. 132 patients (3.2%) were discharged from the hospital within the past 30 days prior to the ED visit. 317 patients (7.7%) were eventually admitted through the ED

Table 1 Referral patterns for surgical specialties from 2017 to 2020

Specialty	Total referrals made	% clinic visits
General surgery	4130	44
Pediatric surgery	185	46
Vascular surgery	773	61
Plastic surgery	1393	41
Orthopedic SURGERY	29,735	42
Otolaryngology surgery	7849	16

Table 2 Sociodemographic characteristics of general surgery referral patients from 2017 to 2020

Characteristic	Value
Age in years, median (range)	42 (18–100)
Female gender, <i>N</i> (%)	2066 (50)
Ethnicity, <i>N</i> (%)	
Hispanic	2089 (51)
Non-Hispanic	1822 (44)
Unknown	239 (5)
Race, <i>N</i> (%)	
Black	1350 (33)
White	270 (7)
AAPI	113 (3)
Other/unknown	2397 (58)
SES, median (range)	– 3 (– 10 to 4)
Medicaid/Medicare, <i>N</i> (%)	1752 (42)
CCI, median (range)	0 (0–18)
Comorbidities, <i>N</i> (%)	
CHF	101 (2)
DM with complication	162 (4)
Diabetes mellitus	519 (13)
CVA	54 (1)
ESRD	29 (0.7)
HIV	83 (2)
MI	37 (0.9)
PAD	74 (1.8)
Kidney disease	176 (4.3)
Cancer	627 (15.2)
Dementia	28 (0.7)
Metastasis	11 (0.3)
Rheumatic disease	31 (0.7)
Liver disease	
Mild	125 (3)
Severe	19 (0.5)
Social issues addressed during index referral, <i>N</i> (%)	
Seen by ED Navigator	160 (3.8)
Admitted through ED	317 (7.7)
Existing PCP	2962 (72)
New PCP assigned	690 (17)
Transportation status addressed	132 (3.2)
Hospital discharge within last 30 days	132 (3.2)
Surgery clinic visit, <i>N</i> (%)	1806 (44)
Surgery within 60 days of referral, <i>N</i> (%)	614 (15)

AAPI Asian–American and Pacific Islander, SES socio-economic status, CCI Charlson Comorbidity Index, CHF congestive heart failure, DM diabetes mellitus, CVA cerebrovascular accident, ESRD end-stage renal disease, HIV human immunodeficiency virus, MI myocardial infarction, PAD peripheral arterial disease, PCP primary care provider

Table 3 ED visit diagnoses for general surgery referral patients

Diagnosis	<i>N</i> (%)
Skin/soft tissue problem	552 (26)
Hernia-related symptoms	382 (18)
HPB issues	365 (17)
Others	263 (12)
Abdominal pain	224 (10)
GI Bleeding/hemorrhoids	130 (6)
Enteritis/colitis	100 (5)
Cardiopulmonary symptoms	80 (4)
Breast-related symptoms	14 (1)
Foregut issues	15 (1)
Postoperative complications	13 (1)

HPB hepatopancreaticobiliary, GI gastrointestinal

on the index presentation despite being given a referral as well. Only 160 patients (3.8%) were seen by an ED navigator. 614 patients (15%) underwent an elective surgical operation within 60 days. A full list of the sociodemographic characteristics can be seen in Table 2.

The most common ED problem in those patients who showed up to clinic was related to skin and soft tissue issues (26%), followed by hernia-related issues (18%) and hepatobiliary issues (17%) (Table 3).

In terms of the primary outcome, 44% of the patients given a referral showed up to a general surgery clinic visit within 60 days. In univariate analysis, those who showed up to clinic were older (more than 70 years old), tended to be female, had a lower SES, had Medicaid or Medicare insurance and had more comorbidities compared to those who did not show up. This cohort was also more likely to not have an existing PCP. Patients were more likely to show up if a new PCP was assigned during the ED visit (Table 4). Assigning a PCP during the ED visit regardless of an already existing PCP led to 1.8 times higher odds of showing up to a clinic visit (95% CI 1.5–2.2, $p < 0.05$).

The final logistic regression model is displayed in Table 5. In multivariate analysis, patients with a higher CCI were more likely to show up to clinic (OR 1.05, 95% CI 1.02–1.1). Moreover, being on Medicare or Medicaid insurance was associated with higher odds of showing up (OR 2.8, 95% CI 2.4–3.2). Asians and Hispanics were also more likely to show up to clinic after their ED visit (Table 5).

A comparison of the follow-up rates was made to the year 2020 to assess whether the Covid-19 pandemic had affected the primary outcome. Referrals to general surgery were made for 1172 patients in that year. Significantly higher percentage of patients showed up during the year 2020 compared to the prior 3 years (48% vs 44%,

Table 4 Univariate analysis for primary outcome of clinic visit for general surgery referral patients

	Clinic visit	Clinic no-show	<i>p</i> -value
Age, median (range)	44.5 (18–100)	40.2 (18–99)	<.01
SES, median (range)	– 3.4 (– 9.9 to 3.9)	– 2.8 (– 9.9 to 2.5)	<.01
Gender, <i>N</i> (%)			0.04
Female	946 (52)	1161 (49)	
Male	875 (48)	1221 (51)	
Age, <i>N</i> (%)			<.01
≥70 years-old	185 (56)	144 (44)	
Race/ethnicity, <i>N</i> (%)			<.01
Hispanic	997 (47)	1134 (53)	
White	103 (38)	168 (62)	
Black	515 (37)	861 (63)	
AAPI	51 (45)	63 (55)	
Medicare or Medicaid, <i>N</i> (%)	1066 (60)	716 (40)	<.01
CCI, median (range)	1 (0–16)	0 (0–18)	<.01
Comorbidities, <i>N</i> (%)			
ESRD	19 (66)	10 (35)	0.01
CHF	53 (53)	48 (48)	0.07
CVA	36 (67)	18 (33)	<.01
DM	275 (53)	244 (47)	<.01
DM with complications	100 (62)	62 (38)	<.01
HIV	42 (51)	41 (49)	0.20
MI	15 (41)	22 (50)	0.69
PAD	42 (57)	32 (43)	0.02
PUD	12 (48)	13 (52)	0.66
Chronic kidney disease	112 (64)	64 (36)	<.01
Cancer	346 (55)	281 (45)	<.01
Social issues addressed during index referral, <i>N</i> (%)			
Seen by ED navigator	77 (48)	83 (52)	0.25
Admitted through ED	170 (54)	147 (46)	<.01
Existing PCP	391 (33)	777 (67)	<.01
New PCP assigned	403 (58)	287 (42)	<.01
Transportation status addressed	68 (52)	64 (48)	0.06
Inpatient admission 30 days before referral	66 (50)	66 (50)	0.13

Bold values indicate statistically significant results

$z = -3.05$, $p = 0.002$). The total number of televisits for general surgery clinics was 67 in the year 2020 compared to zero in the prior 3 years.

Discussion

This study provides a comprehensive analysis of 45,237 patients who were provided a surgery clinic referral from the emergency department at a busy tertiary care center, and specifically of the 4130 patients given a general surgery referral. For this latter cohort, the three most common problems for referral were skin and soft tissue related, hernias and hepatobiliary related.

Interestingly, adherence to referral appointments was about the same for general surgery, pediatric surgery, plastic surgery and orthopedic surgery, while being higher for vascular surgery and quite low for otolaryngology. The literature supports average adherence rates around 50% for surgical specialties and 36% for primary care practices, suggesting this study's institution is below average in this area [7, 8].

It is notable that overall the older and sicker patients, those on Medicaid/Medicare insurance, and those with poor continuity of care by means of not having an existing PCP were more likely to show up to clinic. The exact reasons for this have yet to be elucidated, but may have to do with surgical patients in general being high acuity and

Table 5 Multivariate logistic regression for primary outcome of clinic visit for general surgery referral patients

Variables	Odds ratio	<i>p</i> -value	95% CI
Ethnicity/race			
A-API versus White	2	0.0137	1.1–3.3
Hispanic versus White	2.1	<.0001	1.5–2.9
Other versus White	2.2	<.0001	1.5–3.2
Black versus White		0.057	
Medicaid/Medicare versus private insurance	2.8	<.0001	2.4–3.2
Higher CCI	1.05	0.0023	1.02–1.1
Social issues addressed during index referral			
Existing PCP vs no PCP	0.7	0.0039	0.6–0.9
New PCP assigned regardless of existing PCP	1.8	<.0001	1.5–2.2
Admitted through ED		0.39	

Bold values indicate statistically significant results

A-API Asian–American and Pacific Islander

needing closer follow-up especially in sicker individuals. It can be concluded from this study that targeting younger and healthier patients with private insurance and who already have good continuity of care to make sure they make it to the surgical clinic may significantly improve the referral adherence rate. There are several reasons for needing to pursue this. First, improving adherence rate could reduce time from presentation to diagnosis, potentially improving outcomes. Moreover at busy tertiary care emergency rooms, improved adherence may decrease overcrowding and ED utilization and improve quality, cost savings and revenue, especially as more clinic visits should theoretically lead to more surgeries booked [7]. In this study, only 15% of the referred patients to general surgery underwent a surgical procedure within 60 days. One limitation in analyzing insurance data in this study is that self-pay patients were not captured. Moreover, Montefiore does not accept uninsured patients who don't qualify for financial assistance. Both of these subgroups could affect adherence rate in this study.

In this study, Hispanics were more likely to follow up in clinic compared with Blacks and non-Hispanic Whites. This was shown even at the multivariate level. Disparities in diagnosis and treatment of racial minorities exist in the emergency department. The existence of unconscious bias has been documented among a number of health care providers across specialties. Although there are mixed results in the literature, unconscious bias has been implicated in disparate clinical decision-making and poor health outcomes in a number of surgical and unexpected conditions [9–13]. This is a potential area of improvement among healthcare workers in terms of self-awareness and “blind spot” recognition [9].

Interestingly, patients with a lower SES were more likely to follow up in clinic in the initial analysis but this difference did not bear out in the multivariate analysis. The

importance and meaning of SES as a variable in this study is difficult to decipher. It is possible that patients that live too far from clinic or are from a particular census block may have difficulty following up and therefore affect adherence, but SES may not be the best variable to capture this and other variables that capture economic and racial disparity more thoroughly should be considered.

A major strength of this study is the large sample size allowing for multivariate analysis for risk factors affecting referral adherence. This study provides a clear roadmap for how to begin targeting interventions in improving outpatient clinic adherence. One potential intervention could be assigning navigators in the ED to follow-up with patients who are younger and healthier, with private insurances who have existing PCP's to ensure they follow up as advised.

Another strategy can include targeted televisits, especially in light of today's healthcare landscape. The time period studied here was between 2017 and 2020. Interestingly when looking at the year 2020, the start of the Covid-19 pandemic in the United States, a significantly higher percentage of patients showed up to the general surgery clinic, despite a similar total number of referrals as the prior 3 years. Despite the number of televisits in the general surgery clinic reaching a record high volume, there is still room for significant improvement when compared to other specialties [14–16]. Telemedicine was only used by 8% of Americans in 2019 [17]. Due to the COVID-19 pandemic, telemedicine is transforming the healthcare landscape with breathtaking speed. In one study looking at the implementation of telemedicine during the beginning of the COVID-19 pandemic in New York City, the urgent care video-visit volume increased to over 7000 visits after 10 days. The forced transition to video visits in this study also demonstrated its feasibility, satisfaction, and value in promoting social distancing [17].

There are several limitations to this study. First, this was a retrospective study of a single institution's referral patterns, and so certain patterns may not be generalizable to other centers. Also, the nature of this study did not allow us to assess the appropriateness of referrals to surgery clinics. Thus it is possible that there is some over-referring for self-limiting symptoms that may not require a surgeon. In addition, it is possible that patients presented to another institution for treatment of an unresolved issue. Finally, the data presented here is from an institution-specific database and thus dependent on how it was extracted. Further research efforts to address adherence, as well as comparing urgent and nonurgent scenarios can create a more comprehensive picture of this challenging issue.

Conclusions

This study provides a comprehensive analysis of 45,237 patients who were provided a surgery clinic referral from the emergency department at a busy tertiary care center. For general surgery specifically, only 44% adhered with an outpatient clinic appointment. Assigning navigators in the ED to follow-up with patients who are younger and healthier, with private insurances who have existing PCP's to ensure they follow up as advised and increasing the use of televisits are potential targeted interventions to improve the primary outcome of clinic adherence.

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