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Predictive overbooking and active recruitment increases uptake of endoscopy appointments among African American patients

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Abstract

Background and Aims—Utilization of GI endoscopy is historically lower in non-white ethnic and racial groups compared with whites. These disparities are multifactorial but likely contribute to differences in GI clinical outcomes. We sought to improve endoscopy uptake overall and in minorities by predictive overbooking and active recruitment in a hospital-based GI clinic.

Methods—From January to October 2014, we alternated between traditional booking for Veterans Affairs Healthcare Network (VA) patients with a physician recommendation for endoscopy and active recruitment of patients to fill projected open endoscopy appointment slots. On intervention weeks, patients attending GI clinic were given the opportunity to "fast-track" to an endoscopy appointment on short notice. During control weeks, patients were not actively recruited. We compared uptake of endoscopy appointments in both groups and performed logistic regression to determine predictors of participation in "fast-track" active recruitment.

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Results—During "fast-track" active recruitment for endoscopy, the clinic recruited an additional 111 patients for endoscopy over passive recruitment, including 46 African Americans (41.4%). In a logistic regression model controlling for demographic and clinical characteristics, African Americans were twice as likely (adjusted OR, 1.99; 95% CI, 1.26-3.17) than whites to participate in the "fast-track" option for recommended endoscopy.

Conclusion—Interventions to actively recruit patients for endoscopy increased the overall percentage of GI clinic patients undergoing endoscopy and disproportionately improved endoscopy appointment uptake in African Americans.

Keywords

disparities; utilization; absenteeism

Introduction

Endoscopy is an essential diagnostic tool for the detection and treatment of gastrointestinal (GI) disease and an important screening tool for the prevention of GI malignancy [1-3]. Flexible sigmoidoscopy and colonoscopy are widely used for the diagnosis of colonic disease and are the only procedural modalities available to remove pre-cancerous colon polyps [3, 4]. Esophagogastroduodenoscopy (EGD) is a common diagnostic procedure performed by endoscopists worldwide and is the primary tool for screening of conditions like Barrett's esophagus and esophageal varices [2].

Despite various indications for use, rates of diagnostic endoscopy are historically lower in non-white ethnic and racial groups compared with non-Hispanic whites [3, 5, 6]. In a large cohort of African American patients in an inner city setting, completion rates were 17.5% and 22.8%, respectively, for recommended outpatient EGD and colonoscopy [7]. African Americans are also less likely to adhere to colonoscopy than whites when recommended for screening [8-10]. Our research group has demonstrated differences in the use of colonoscopy for colorectal cancer (CRC) screening in a large and demographically diverse Veterans Affairs Healthcare Network (VA) where uptake of colonoscopic screening was significantly lower in eligible African American veterans than white veterans in a retrospective analysis of CRC screening utilization [11]. These inequities existed despite a known higher risk of CRC among African Americans and guidelines from the American College of Gastroenterology to preferentially screen for CRC with colonoscopy in African Americans [12].

Disparities in uptake of diagnostic and screening endoscopy are likely multifactorial. Patient-level barriers like fear of invasive procedures and perceived importance of indicated procedures as well as provider- and system-level dynamics like physician counseling practices and physical access to procedures contribute to suboptimal use of endoscopy in minorities [13]. That patients are typically recruited passively for endoscopy—after receiving a physician recommendation, they must often call the clinic to schedule endoscopy—may impose additional barriers that disproportionately affect minorities. Even once an endoscopy appointment is made, African Americans are less likely than whites to present for the procedure. In a recent analysis of endoscopy attendance at 69 Veterans Affairs (VA)

facilities, African American race was significantly and positively associated with missed endoscopy appointments [14].

The present study is part of a large VA-funded effort to improve access to care and to help address concerns about procedure scheduling in the VA Healthcare System. Given recent national criticism of low procedure completion in the VA, our intervention aimed to improve EGD, flexible sigmoidoscopy, and colonoscopy uptake among all veteran patients seen in the VA GI clinic by calling or speaking to patients directly about appointments, and by making appointments available on short notice [15]. Given low GI procedure attendance among African Americans, we also sought to determine whether our intervention could improve disparities in procedure utilization in our facility.

Methods

Overview and Patients

The research was conducted as part of a larger study assessing the validity and efficacy of a predictive overbooking system tested in a GI outpatient clinic [16]. All patients were veterans of the United States (U.S.) military service, who had been recommended for an outpatient EGD or colonoscopy by a physician in the Veterans Administration Greater Los Angeles Healthcare System (VAGLA), a demographically diverse network of 15 healthcare clinics in the Los Angeles area that serves more than 1.4 million veterans. Patients who chose to participate in the testing of our predictive overbooking system provided informed verbal consent to be scheduled for endoscopy on short notice. Study design and procedures were formally reviewed and approved by the VA Institutional Review Board (VA IRB # CC 2013-040489).

Predictive Overbooking

In previous research, we used patient- and clinic-level data obtained retrospectively to develop a predictive model of patient absenteeism for GI endoscopy procedures. We selected possible predictors of absenteeism from a review of existing literature and an informal survey of VA care providers, and tested these using logistic regression[17]. We tested our final multivariable model using bootstrapping to avoid estimation bias. Data for the prediction model were obtained through automated electronic health record (EHR) review for each patient with an upcoming appointment scheduled. Predictors of not attending GI endoscopy appointments (ie, "no-show") included previous no-shows or cancellations, global disease comorbidity, and current mood or substance use disorder diagnoses. Based on these results, we used a predictive overbooking model to calculate a no-show risk score for each patient. Those patients whose scores exceeded a critical cut-off value were predicted to no-show for their appointments [16]. We validated the predictive overbooking model using separate patient data over a 4-month period [17].

"Fast-Track" Active Recruitment

To examine the degree to which this predictive overbooking system could improve performance in a working GI clinic, we prospectively collected socio-demographic and medical record data about patients recommended for endoscopy between March and

November 2014. We used these data to calculate no-show risk scores for each patient, generated a 10-workday calendar of upcoming appointments, and flagged those appointments for patients predicted to no-show as available for other patients on short notice.

To actively recruit patients on short notice, we developed a process called "fast-track," and tested this process during 17 randomly selected experimental weeks in the validation period. In "fast-track," patients who had recently been recommended for endoscopy by their primary care physician or by a GI physician at the weekly GI clinic were offered the opportunity to complete their endoscopies on short notice (ie, within the next 2 weeks, the span of the prediction calendar). Patients were recruited in-person at the weekly GI clinic or, if recommended for endoscopy at their primary care visit, were subsequently contacted by research staff by phone. In all cases, patients were told about the key benefit of the study, namely that that they would be seen for endoscopy within 2 weeks. They were also made aware of the study risks—that they may have to wait longer than usual on the day of the appointment, and that non-critical procedures not requiring bowel preparation could be rescheduled in the event of clinic overload. Patients were offered "fast-track" appointments after acknowledging they understood these benefits and risks and provided informed consent; those patients scheduled for colonoscopy were scheduled with enough time to complete the standard polyethylene glycol preparation. We did not actively seek patients of certain racial, ethnic, or socioeconomic groups, but offered the "fast-track" option to all eligible patients. During 17 separate study control weeks, patients were not actively recruited, the "fast-track" option was not made available, and the operations of the clinic were not altered.

Statistical Analyses

We obtained patient data from the VA Computerized Patient Record System (CPRS), including demographics, clinical diagnoses, and patient attendance histories. Demographic variables included age, race/ethnicity, and level of VA cost coverage (ie, percentage of service connectedness). Service connectedness is a system-level variable for patients treated at VA hospitals based on the degree to which a given injury or condition can be attributed to military service experiences. In the VA system, individuals with high service connectedness do not bear financial responsibility for screening services, whereas those with low service connectedness bear some financial responsibility.

To generate clinical variables, we automatically processed raw text from patients' active problem lists and procedure histories to flag ICD-9 codes associated with particular diagnoses or treatments, and we generated dichotomous variables for each relevant condition. We also created a dichotomous socioeconomic status (SES) variable by searching for the ICD-9 code domain V.60 applied during the last 3 years. Clinical history reviews were limited to the most recent 3 years of data available for a given patient. As a measure of overall disease burden for each patient, we calculated the Charlson comorbidity score.

We compared differences in demographic variables between active and passive recruitment using chi-squared tests and the Student t tests. To account for the independent effects of race/ethnicity and other demographic variables on "fast-track" participation, we conducted a

logistic regression analysis, with participation in active recruitment as the outcome variable. The adjusted logistic regression model included variables for race/ethnicity, age, sex, VA service connectedness, body mass index (BMI), Charlson comorbidity, alcohol and drug use disorder, mood disorder, and SES. We entered age, VA connectedness, BMI, and Charlson comorbidity score as continuous variables in logistic regression models, whereas we entered race/ethnicity, sex, alcohol/drug use disorder, mood disorder and SES as categorical variables. We conducted all analyses using Stata version 13.1 (Statacorp, College Station, Tex).

Results

Patient Characteristics

Through passive recruitment of patients for endoscopy, the clinic scheduled 1448 patients for endoscopy, including 518 African Americans (35.77%), 196 Hispanics (13.54%), and 45 individuals who identified as Asian American, Pacific Islander, or Native American (3.11%). During "fast-track" active recruitment for endoscopy, we recruited an additional 111 patients, including 46 African Americans (41.44%), 13 Hispanics (11.71%), and 7 individuals who identified as Asian American, Pacific Islander, or Native American (6.31%). Sixty patients were scheduled for a colonoscopy, 40 were scheduled for an EGD, 4 patients were scheduled for a colonoscopy and EGD at the same visit (a "double" procedure), and 7 were scheduled for a flex sigmoidoscopy. See Table 1 for complete information on patients booked using active and passive recruitment methods.

"Fast-Track" Active versus Passive Recruitment

Participants in active booking were younger than those that were booked passively (59.4 years vs 61.9 years; p=0.02). African Americans were more commonly recruited actively through "fast-track" versus passively, but this difference was not statistically significant in bivariate analyses, χ^2(1559, df=1)= 1.43, p=0.23. Also, the number of Asian American, Native American, or Pacific Islander patients booked doubled in percentage during active recruitment, and this difference was marginally significant [χ^2(1559, df=1)= 3.27, p=0.07]. The number of whites (n = 44, p=0.14) and Hispanics (n = 13, p=0.59) recruited through "fast-track" were not statistically different compared with passive recruitment. Notably, patients who participated in active recruitment were less likely to have low SES [χ^2(1559, df=1)= 42.11, p<0.0001] and more likely to have high levels of VA service connectedness [t(1557)=2.65, p=0.008]. Conversely, passive recruitment was more common in those with higher comorbidity [t(1557)=2.76, p=0.006] and in those with mood disorders (χ^2(1559, df=1)= 14.41, p<0.0001).

Among African Americans, participation in "fast track" contributed to improved attendance for endoscopy, although this improvement was not statistically significant. Among the 46 African American fast-track patients, 80.4% completed an endoscopy, compared with 73.7% of African Americans who completed an endoscopy appointment booked using standard of care. The difference in percentage would have been significant if the program had been able to recruit 50% more African Americans (69) who completed appointments at the same rate.

Predictors of Participation in Active Recruitment

Using multivariable logistic regression, we were able to determine significant predictors of "fast track" utilization while controlling for confounders. When controlling for age, sex, histories of substance use and mood disorders, BMI, VA service connectedness, and SES, the odds of African Americans participating in "fast-track" active recruitment were 1.99 times greater than whites (adjusted OR, 1.99; 95% CI, 1.26-3.17). This difference reached significance in our controlled models. Patients who reported SES difficulties were significantly less likely to use the "fast-track" program in controlled models (adjusted OR, 0.17; 95% CI, 0.09-0.31), as were patients who reported a history of a mood disorder (adjusted OR, 0.53; 95% CI, 0.33-0.86). Patients who reported a history of alcohol or drug use disorders were more likely to use "fast-track" (adjusted OR, 1.77; 95% CI, 1.09-2.85). Adjusted odds ratios (OR) for all predictor and control variables are shown in Table 2.

Discussion

In this study, we demonstrate that predictive overbooking and "fast-track" active recruitment of veterans recommended for routine upper and lower endoscopic procedures can result in increased uptake of appointments overall and among African Americans. As endoscopy utilization rates are historically lower in African Americans than in whites, the intervention is capable of disproportionately helping a population subgroup that faces well-documented disparities in healthcare utilization and outcomes. In addition, our study suggests that veterans with low SES or mood disorders are less likely to take advantage of a "fast-track" endoscopy option, whereas veterans with alcohol or substance use are agreeable to such interventions.

As large healthcare networks in the United States aim to reduce waste and cut costs, system efficiency is paramount. In the VA, recent concerns about prolonged procedure wait-times has led to system-wide changes and policy to minimize wait time for procedures like colonoscopy. Our findings support that interventions that include active recruitment are one mechanism to achieve these goals. Throughput at our endoscopy clinic improved by 14% during the course of this study, from 86% to 100% of capacity on average. By improving utilization of endoscopy appointments in outpatient settings, the VA can improve system efficiency and minimize wait-times for procedures. Furthermore, such interventions may address racial disparities in endoscopy attendance recognized in the VA healthcare system [11, 18]. Our findings are consistent with prior studies that show that predictive overbooking strategies, nurse-delivery phone calls, and interactive voice response system phone calls can reduce endoscopy absenteeism, however expand upon those prior interventions by also impacting racial inequities [19, 20].

Our study has several strengths. First, by implementing the "fast track" intervention in a diverse patient sample, we were able to evaluate the relationship between race and participation in active recruitment for endoscopy. Second, as there is minimal variation in access to insurance and healthcare among those that receive VA services, we were able to minimize confounding by SES and issues of access to insurance that often complicate studies of health care inequalities. Third, access to detailed VA electronic medical records for each patient allowed us to assess the role of several patient-level factors on participation

in active recruitment. Last, by developing an intervention to address system efficiency in a large healthcare network, we were able to identify a mechanism to improve the efficiency and quality of care provided to veterans—a primary aim of the VA health system.

Despite these strengths, there were limitations to the present analyses. First, our analyses were limited to one GI clinic within the VA healthcare network. Further, given that the patient population in the VA is predominately male, our findings may not be generalizable to other patient populations or clinical settings. As the goal of this research was to address inefficiencies in endoscopy scheduling in the VA, the ability to generalize our findings to non-VA healthcare settings is less relevant. Nonetheless, our research lays the groundwork to assess similar interventions in other care settings. Second, our study design was limited to a 5-month period, preventing us from controlling for possible seasonal trends in endoscopy utilization. Although a 1-year study may have minimized concerns about seasonal bias, there is no current evidence that endoscopy attendance or racial disparities in endoscopy attendance vary seasonally. Lastly, the small number of African American subjects in the active recruitment subgroup did not allow us to determine if the intervention impacted actual endoscopy attendance or completion in multivariable analyses. Although demonstrating higher endoscopy completion is important, that the "fast track" intervention motivated African American patients to consider and pursue endoscopy earlier rather than later provides insight into mutable factors that might promote greater endoscopy utilization and lays the groundwork for applying the intervention to a larger patient sample.

Despite the study's limitations, the findings add to current knowledge about racial disparities in endoscopy utilization. In addition, the findings provide insight on mechanisms to improve endoscopy uptake and efficiency overall and in African Americans in particular. Future research will evaluate the impact of the "fast track" intervention on endoscopy attendance and utilization disparities in a larger sample of veterans.

Acknowledgments

References

1. Cohen LB, Wecsler JS, Gaetano JN, et al. Endoscopic sedation in the United States: results from a nationwide survey. Am J Gastroenterol. 2006; 101(5):967–74. [PubMed: 16573781]

2. Lieberman DA, De Garmo PL, Fleischer DE, et al. Patterns of endoscopy use in the United States. Gastroenterology. 2000; 118(3):619–24. [PubMed: 10702214]

3. Lieberman DA, Holub J, Eisen G, et al. Utilization of colonoscopy in the United States: results from a national consortium. Gastrointest Endosc. 2005; 62(6):875–83. [PubMed: 16301030]

4. Sonnenberg A, Amorosi SL, Lacey MJ, et al. Patterns of endoscopy in the United States: analysis of data from the Centers for Medicare and Medicaid Services and the National Endoscopic Database. Gastrointest Endosc. 2008; 67(3):489–96. [PubMed: 18179793]

5. Zimmerman RK, Tabbarah M, Trauth J, et al. Predictors of lower endoscopy use among patients at three inner-city neighborhood health centers. J Urban Health. 2006; 83(2):221–30. [PubMed: 16736371]

6. McMahon LF Jr, Wolfe RA, Huang S, et al. Racial and gender variation in use of diagnostic colonic procedures in the Michigan Medicare population. Medical care. 1999; 37(7):712–7. Epub 1999/07/29. [PubMed: 10424642]

7. Jackson DS, Egbuonnu N, Umunakwe C, et al. Scheduled out-patient endoscopy and lack of compliance in a minority serving tertiary institution. Am J Med Sci. 2012; 344(3):194–8. [PubMed: 22197978]

8. May FP, Almario CV, Ponce N, et al. Racial Minorities Are More Likely Than Whites to Report Lack of Provider Recommendation for Colon Cancer Screening. The American journal of gastroenterology. 2015; 110(10):1388–94. Epub 2015/05/13. [PubMed: 25964227]

9. Nishihara R, Wu K, Lochhead P, et al. Long-term colorectal-cancer incidence and mortality after lower endoscopy. The New England journal of medicine. 2013; 369(12):1095–105. [PubMed: 24047059]

10. Harmon BE, Little MA, Woekel ED, et al. Ethnic differences and predictors of colonoscopy, prostate-specific antigen, and mammography screening participation in the multiethnic cohort. Cancer Epidemiol. 2014; 38(2):162–7. [PubMed: 24667037]

11. May FP, Bromley EG, Reid MW, et al. Low uptake of colorectal cancer screening among African Americans in an integrated Veterans Affairs health care network. Gastrointestinal endoscopy. 2014; 80(2):291–8. Epub 2014/03/29. [PubMed: 24674351]

12. Rex DK, Johnson DA, Anderson JC, et al. American College of Gastroenterology guidelines for colorectal cancer screening 2009 [corrected]. Am J Gastroenterol. 2009; 104(3):739–50. [PubMed: 19240699]

13. Bromley EG, May FP, Federer L, et al. A Systematic Review of Patient, Provider, and System Barriers to Colorectal Cancer Screening With Colonoscopy in African-Americans. Gastroenterology. 2013; (AB Mo1110):S581.

14. Partin MR, Gravely A, Gellad ZF, et al. Factors Associated With Missed and Cancelled Colonoscopy Appointments at Veterans Health Administration Facilities. Clin Gastroenterol Hepatol. 2016; 14(2):259–67. [PubMed: 26305071]

15. Kizer KW, Jha AK. Restoring trust in VA health care. N Engl J Med. 2014; 371(4):295–7. [PubMed: 24896816]

16. Reid MW, Cohen S, Wang H, et al. Preventing patient absenteeism: validation of a predictive overbooking model. Am J Manag Care. 2015; 21(12):902–10. [PubMed: 26671702]

17. Reid MW, M F, Cohen S, Wang H, Williams D, Martinez B, Spiegel BMR. Preventing Clinic No-Shows: Prospective Validation of a Predictive Overbooking Model. American Journal of Gastroenterology. 2016 Epub 2016/07/05.

18. Burgess DJ, van Ryn M, Grill J, et al. Presence and correlates of racial disparities in adherence to colorectal cancer screening guidelines. Journal of general internal medicine. 2011; 26(3):251–8. Epub 2010/11/23. [PubMed: 21088920]

19. Sonnenberg A. How to overbook procedures in the endoscopy unit. Gastrointest Endosc. 2009; 69(3 Pt 2):710–5. [PubMed: 19251015]

20. Griffin JM, Hulbert EM, Vernon SW, et al. Improving endoscopy completion: effectiveness of an interactive voice response system. Am J Manag Care. 2011; 17(3):199–208. [PubMed: 21504256]

Abbreviations

GI	Gastrointestinal
VA	Veterans Affairs Healthcare Network
OR	Odds Ratio
CI	Confidence Interval

EGD	Esophagogastroduodenoscopy
HER	electronic health record
CPRS	Computerized Patient Record System
BMI	body mass index
SES	socioeconomic status
ICD-9	international Classification of Diseases- ninth edition
df	degrees of freedom
sd	standard deviation
CRC	colorectal cancer

Table 1

Demographic characteristics of patients booked for endoscopy during validation of predictive overbooking procedure.

Characteristic	Passive booking (N = 1448)	"Fast-track" (N = 111)	*P* Value
Age – Mean (SD)	61.9 (10.2)	59.4 (14.1)	0.02
Sex – N Males (%)	1391 (96.1)	105 (94.6)	0.45
Race/Ethnicity – N (%)			
White	679 (46.9)	44 (39.6)	0.14
African American	518 (35.8)	46 (41.4)	0.23
Asian/Pacific Islander/ Native American	45 (3.1)	7 (6.3)	0.07
Hispanic	196 (11.0)	13 (11.7)	0.59
Declined/Unknown	10 (0.7)	1 (0.9)	0.80
SES (ICD-9 V.60) – N Low (%)	682 (47.1)	17 (15.3)	<0.0001
VA Service Connectedness – Mean % (SD)	24.1 (35.2)	33.3 (39.1)	0.008
Charlson Comorbidity – Mean (SD)	5.5 (3.3)	4.5 (2.9)	0.006
History of Alcohol or Drug Use – N (%)	545 (37.6)	37 (33.3)	0.37
History of Mood Disorder – N (%)	714 (49.3)	34 (30.6)	<0.0001
Body Mass Index (BMI) – Mean (SD)	29.3 (5.6)	28.9 (5.0)	0.46
Appointment Attendance – N (%)	319 (22.0)	18 (16.2)	0.15

Table 2

Predictors of "fast-track" active recruitment participation (n=1552).

Predictor	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
African American race	1.27 (0.86-1.88)	**1.99 (1.26-3.17)**
Asian American, Native American, or Pacific Islander Race	2.10 (0.92-4.77)	1.94 (0.78-4.79)
Hispanic Ethnicity	0.85 (0.47-1.54)	0.96 (0.49-1.86)
Unknown Race/Ethnicity	1.31 (0.17-10.31)	1.00 (0.12-8.31)
Age	1.00 (1.00-1.00)	1.00 (1.00-1.00)
Sex	0.72 (0.30-1.70)	1.12 (0.41-3.04)
VA Service Connectedness	**1.01 (1.00-1.01)**	**1.01 (1.00-1.01)**
BMI	0.99 (0.95-1.02)	0.99 (0.95-1.03)
Charlson Comorbidity Score	**0.91 (0.85-0.97)**	0.95 (0.87-1.04)
History of Alcohol or Drug Use Disorder	0.83 (0.55-1.25)	**1.76 (1.09-2.84)**
History of Mood Disorder	**0.45 (0.30-0.69)**	**0.53 (0.33-0.86)**
Socioeconomic Difficulties (SES, ICD-9 V.60)	**0.20 (0.12-0.34)**	**0.17 (0.10-0.31)**

Notes: White race is used as the reference group.

All OR values significant at the $\alpha = 0.05$ level are marked in **bold**.