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Colorectal Cancer Screening Completion Among Individuals With and Without Mental Illnesses: A Comparison of 2 Screening Methods

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Abstract

Purpose: Cancer mortality is worse among people with psychiatric disorders. The purpose of this study was to compare facilitators and rates of colorectal cancer (CRC) screening between people with and without mental illnesses.

Design: We conducted a secondary analysis using data from a general population cohort study (N = 92 445) that assessed effects of 2 types of CRC screening test kits—guaiac fecal occult blood testing (gFOBT) and fecal immunochemical testing (FIT)—on CRC screening completion.

Setting: The setting was a health system that served approximately 485 000 members in urban and suburban Oregon and Washington.

Participants: Participants were health system members, categorized by mental illness diagnosis (psychotic disorders, nonpsychotic unipolar depression, and no mental illness), who were age-eligible, at average risk of CRC, and were at least 366 days past their last gFOBT with no evidence of other CRC screening.

Measures: The outcome was time until completion of CRC screening.

Analysis: We used Cox proportional hazard models.

Results: FIT reduced CRC screening barriers for all the groups. Compared to people without mental illness diagnoses, those with psychotic disorders were equally likely to screen using FIT (hazard ratio [HR] = .95, $p = .679$) and those with depression were more likely (HR = 1.17, p=.006).

Conclusions: FIT can improve CRC screeningrates among people with mental illnesses, particularly depression.

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Declaration of Conflicting Interests

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Keywords

cancer; colorectal; prevention; screening; mental illness

Purpose

Cancer is a leading cause of premature death among individuals with serious mental illnesses.[1] Among cancers that affect both men and women, colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States.[2] While it is unclear whether CRC incidence among individuals with mental illness diagnoses is greater than in the general population,[3–5] CRC mortality rates among individuals with bipolar disorder or schizophrenia appear worse than in the general population, with late diagnosis potentially contributing to survival disparities.[5–7]

Early cancer detection through preventive screening is a priority for all patients aged 50 to 75 at average risk,[8,9] yet previous studies have shown that CRC preventive screening rates among people with psychiatric disorders are suboptimal.[10–14] Although depression may be a facilitator of CRC screening,[15] evidence of specific CRC screening barriers among this population is lacking. We do know that when individuals with serious mental illnesses make it in to see the doctor, the salience of acute mental health symptoms sometimes overshadows physical health concerns.[16] Further, individuals with bipolar disorder or schizophrenia have been shown in several studies to access primary care less often than individuals without these diagnoses,[17,18] particularly if they are older.[19] Screening compliance might be improved by methods that do not require a health-care visit. In the general population, telephone outreach to promote use and return of at-home screening test kits[20] and switching to an easier screening method (fecal immunochemical testing [FIT] vs guaiac fecal occult blood testing [gFOBT])[21] improved CRC screening rates, particularly among harder to reach groups (eg, those with more comorbidities, those without a primary care physician, and the elderly).

In this article, we report results of a secondary analysis using data from a large cohort study that compared these 2 types of CRC screening test kits in the general membership of an integrated health system. Our objective was to compare CRC screening completion for people with and without mental illness diagnoses, and between psychiatric subgroups, during 2 periods when these different CRC screening methods were used. Based on the parent study, we hypothesized that, relative to gFOBT, FIT would improve CRC screening completion for all the groups. We also hypothesized that compared to people without mental illness diagnoses, people with nonpsychotic unipolar depression would be equally likely to complete CRC screening, and people with psychotic disorders would be less likely to complete CRC screening.

Methods

Design

Kaiser Permanente Northwest (KPNW) is a prepaid group model integrated health system; at the time it served approximately 485 000 members at urban and suburban clinics surrounding the (Portland, Oregon and Vancouver, Washington) metro areas. A natural experiment occurred when KPNW switched from using the gFOBT to using the FIT test. Comparatively, the gFOBT is more burdensome because it requires dietary and medication restrictions during the 3 days that 3 separate stool samples are collected, whereas the single sample FIT test does not have these restrictions, making it easier to complete. A survey of patients who had experience with both types of test kits revealed that FIT was easier to complete, more convenient, and less unpleasant than gFOBT.[21]

The parent study[21] examined whether the transition from gFOBT to FIT improved CRC screening completion among 92 445 KPNW members who were overdue for CRC screening and who received automated telephone outreach CRC screening reminder calls and at-home test kits.[20,21] Patients were determined overdue if they were at average risk for CRC and age-eligible for CRC screening but had no colonoscopy within 10 years, no flexible sigmoidoscopy or double-contrast barium enema (DCBE) within 5 years, no gFOBT screening within 1 year, and no order for gFOBT or DCBE within 3 months.

The CRC screening completion was compared during 2 distinct time periods: (1) during a 15-month period when gFOBT was offered in routine care (gFOBT period, January 01, 2008, to March 31, 2009) and (2) during a 9-month period when only FIT was offered (FIT period, April 01, 2009, to December 31, 2009). The study found that offering FIT improved screening completion, although the degree of improvement in screening varied by patient characteristics: FIT improved screening rates more among those who were older, female, taking more medications (proxy for comorbidity), without an assigned primary care provider (PCP), and with fewer specialty visits.[21]

Sample

In the current study, we examined whether reducing barriers associated with preparation for gFOBT, by offering FIT, was equally effective in improving screening completion for individuals with psychotic disorders, nonpsychotic major depression, and no history of these diagnoses. Diagnoses were derived from the electronic medical record; we required 2 instances of a diagnosis in order to reduce misidentification based on a single instance of a diagnosis that might have been recorded in error.

Using the data from the parent study, we reexamined CRC screening completion data during the same 2 time periods (gFOBT period and FIT period) and tested whether change in screening completion rates after the health system switched from gFOBT to FIT differed for people without mental illness diagnoses compared to those with psychotic disorders or nonpsychotic major depression. The latter group was analyzed separately because in the few available studies documenting facilitators of CRC screening, depression was associated with increased CRC screening behavior.[11,15] The study was approved and monitored by the

KPNW Institutional Review Board; because it was an analysis of secondary data only, a waiver of informed consent was approved.

Measures

All variables were extracted from the electronic medical record (EMR). The primary outcome was completion of CRC screening by any method (gFOBT, FIT, colonoscopy, dual contrast barium enema, and sigmoidoscopy) within 9 months of an automated outreach telephone call designed to prompt CRC screening completion. Diagnostic category had 3 levels: psychotic disorders (schizophrenia spectrum disorders, bipolar disorder, and major depressive disorder with psychotic features), nonpsychotic unipolar depression (mild, moderate, and severe major depression without psychosis), and no mental illness diagnosis (no history of these disorders). To reduce the chance of including individuals who had been given a diagnosis in error, a diagnosis had to appear in the EMR on at least 2 separate dates for an individual to qualify for inclusion. If an individual had both a psychotic disorder and a nonpsychotic unipolar depression diagnosis in their record, they were classified in the psychotic disorders group. Variables identified in the parent study as differing between the 2 periods were included as covariates in analyses. These included age at date of the reminder call, gender, race (geocoded with census tract information when data were missing), length of health plan membership, number of medications at time of reminder call, body mass index (BMI), having an assigned PCP, 1 or more visits with the assigned PCP or with a different PCP (other PCP visits), 1 or more specialty medical visits, and 1 or more “other” specialty visits (eg, neurosurgery and optometry) within 9 months of the call.

Analysis

Differences between the 3 diagnostic groups on covariates identified as predictive of CRC outcomes in the parent study were tested with χ^2 and 1-way analyses of variance. Cox proportional hazard models were used for the main analysis. Period (gFOBT vs FIT), diagnostic category (with no mental illness diagnosis as the reference group), and the period by diagnostic category interaction were entered into the model. The interaction was the parameter of interest, as a significant interaction signified that the switch from gFOBT to FIT differed for the 3 diagnostic groups. All covariates (age, gender, race, length of membership, number of medications, BMI, having an assigned PCP, 1 or more PCP visits, medical specialty visit, and other specialty visit) and significant interaction terms with period (age, gender, having a PCP, and other specialty visits) used in the original study were included in the analyses.

In a second set of analyses, we again used Cox proportional hazard models to examine, within the FIT period alone, whether or not predictors of screening completion varied across the 3 diagnostic categories. Diagnostic category was tested first, with no other variables in the model. Then each of the patient characteristics was tested in separate models that included diagnostic category, patient characteristics, and the interactions of diagnostic category with patient characteristics.

Results

Characteristics of participants by diagnostic category are shown in Table 1. The no mental illness diagnosis group was on the fewest medications, had the lowest percentage of females, and the lowest medical utilization across all categories assessed. The psychotic disorders group was on the most medications. The group with nonpsychotic unipolar depression was the youngest, had the highest BMI, and the largest percentage of women and whites.

After adjusting for covariates and previous significant interactions from the parent study, the period by diagnostic category interaction was significant (P=.020, see Table 2). Moving from gFOBT to FIT led to a greater increase in the likelihood of screening for the group with nonpsychotic unipolar depression than for the no mental illness diagnosis group (HR=1.17, P=.006). However, the increase in likelihood of completing screening was similar for people in the no diagnosis and psychotic disorder groups (hazard ratio [HR]=.95, P=.679). For those without mental illness diagnoses, screening completion rates went from 32.0% for gFOBT to 38.3% for FIT. The increase was almost identical for the psychotic disorders group(32.8%−39.0%) and greater for the nonpsychotic unipolar depression group (32.0%−43.1%).

Next, using Cox proportional hazard models (N = 32 589), we examined whether or not the predictors of screening completion during the FIT period varied for the 3 diagnostic categories. As would be expected from the above-mentioned analyses, the categories were significantly different on likelihood to be screened in the FIT period (P < .001, see Table 3). Specifically, the nonpsychotic unipolar depression group was more likely to be screened than the no mental illness diagnosis group (43.1% vs 38.3%; HR = 1.18, P < .001). No significant difference in screening completion likelihood was found between the psychotic disorders group and the no diagnosis group (39.0% vs 38.3%; HR = 1.05, P=.615), nor were there statistically significant interactions between the 3 groups on age, gender, race, length of membership in the health plan, number of medications, BMI, being assigned to a PCP, having more than 1 PCP visit, having a medical specialty visit, or having a surgical or other specialty visit.

Discussion

Individuals with mental illnesses are more likely to die of cancer than the general population,[5–7] and risk of death from CRC is greater in individuals with serious mental illnesses.[6] Some have suggested that emphasizing earlier detection and improving access to CRC screening for people with psychiatric illnesses might reduce this disparity[5,6]; however, most of what is known about barriers and facilitators of CRC screening in this population is based on self-reported screening completion survey data.[11,12,15] Our analysis of EMR-derived screening completion suggests that people with mood disorders or psychosis diagnoses, who were overdue for CRC screening and received outreach reminder calls and at-home test kits, were as likely or more likely to complete CRC screening than those without these diagnoses. Offering FIT as an alternative to gFOBT increased the likelihood of CRC screening completion by approximately 6% for those with psychotic disorders and those without mental illness diagnoses. The increase was approximately 11% for people

diagnosed with nonpsychotic unipolar depression. A 7.7% increase in likelihood of screening with FIT compared to gFOBT was observed overall in the parent study.[21] Increased screening completion with FIT is likely due to the convenience of a single sample test without dietary and medication restrictions that can be taken in the privacy of one's home and returned to the laboratory for analysis. In the parent study, among people with experiences with both test kits, FIT was rated more favorably than gFOBT for convenience and ease of use.

Evidence that switching to FIT can reduce CRC screening barriers for people with mental illnesses, and especially for people with depression, is novel, important, and actionable. Physicians and health systems should not assume these subgroups are unable or unwilling to complete CRC screening, even if they are overdue for screening. Nor should they assume that engaging these subgroups in CRC screening will require additional costly resources, as the percentage of people with and without mental illness diagnoses who completed screening after receiving the same level of outreach was equivalent.

Strengths and Limitations

Strengths of this study include the large cohort size, robust EMR data, and observation of screening rates in a previously understudied integrated care setting and among groups overdue for screening. Limitations include lack of information about effects of automated alerts regarding outstanding preventive services sent to physicians during office visits and effects of mailed outreach correspondence. The relative contributions of these efforts to screening completion are unknown, but the proportion of health system members overdue for CRC screening (19.1%) was substantially less than the national rate (35.5%) around that time.[22] These interventions may have had powerful effects and those effects may have been cumulative. It is also possible, however, that in delivery settings with fewer active system-level screening supports there may be even greater improvement in screening completion with FIT. Other limitations of this study include the observational nature of our study design and the nonoverlapping time periods of gFOBT and FIT, making it difficult to rule out effects of secular changes. Trends in CRC screening (not including reports of FIT testing) appear to have been increasing during 2008 and 2009.[23] Finally, our analysis data set did not include a continuous measure of outpatient utilization, and the sample included only individuals overdue for screening, rather than the entire population with mental illness diagnoses eligible for screening. These differences limit our ability to make comparisons with previous studies.

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So What?

What is already known on this topic? In a general population sample, FIT was superior to gFOBT in improving CRC screening completion rates but improvement varied by patient characteristics. People with serious mental illnesses are an especially vulnerable group with higher case fatality rates of CRC. Whether people with serious mental illnesses complete CRC screening at rates similar to the general population was unknown.

What does this article add? Our results suggest that patients with nonpsychotic unipolar depression are more likely to complete colorectal cancer screening compared to patients without diagnoses of mental illness and that there is no difference in screening completion between the latter group and those with psychotic disorders.

What are the implications for health promotion practice or research? Offering a less burdensome screening test (FIT vs gFOBT) can improve CRC screening for all patients. People with serious mental illnesses are as likely to complete screening as those without mental illness diagnoses, and FIT is especially beneficial for people with nonpsychotic depression.

Table 1.

Cohort Participant Characteristics.

	No Mental Illness Diagnoses, n = 87 438, M (SD)	Psychotic Disorders, n = 1049, M (SD)	Nonpsychotic Unipolar Depression, n = 3958, M (SD)	*P* Value
Age	60.40 (7.29)	61.21 (7.96)	59.78 (7.05)	<.001
Body mass index	30.35 (6.87)	30.86 (7.83)	31.73 (7.76)	<.001
Length of health plan membership	12.17 (11.06)	12.18 (10.87)	12.27 (10.59)	.847
Number of medications	3.47 (3.79)	8.22 (6.17)	7.25 (5.18)	<.001
	%	%	%	
Female	53.31	63.39	70.89	<.001
White	93.87	93.74	95.73	<.001
Has a primary care physician	95.20	98.28	98.64	<.001
Other primary care physician visits	41.55	49.00	47.07	<.001
Medical specialty visits	23.58	31.08	31.91	<.001
Surgical and other specialty visits	59.90	68.45	70.62	<.001
FIT period	35.31	30.79	35.25	.009

Abbreviations: FIT, fecal immunochemical testing; SD, standard deviation.

Table 2.

Cox Proportional Regression Analyses Predicting Time to CRC Screening Completion.

	HR	95% CI	*P*
Treatment			
Period (gFOBT = 0, FIT = 1)	0.95	0.77–1.18	.656
Covariates			
Age	1.02	1.02–1.02	<.001
Period × age	1.01	1.01–1.01	<.001
Female	0.93	0.90–0.96	<.001
Period × gender	1.07	1.02–1.12	.004
White	0.95	0.91–1.00	.040
Length of health plan membership	1.00	1.00–1.01	<.001
Number of medications	1.00	0.99–1.00	.029
Period × number of medications	1.01	1.00–1.01	.011
Body mass index	0.99	0.99–1.00	<.001
Has a primary care physician	1.22	1.13–1.32	<.001
Period × has a primary care physician	0.79	0.70–0.88	<.001
Other primary care physician visits	1.42	1.39–1.46	<.001
Medical specialty visits	1.24	1.21–1.27	<.001
Surgical and other specialty visits	1.86	1.79–1.92	<.001
Period × surgical and other specialty visits	0.80	0.76–0.85	<.001
Predictors			
Mental illness diagnosis			.278
No diagnosis vs psychotic disorders	0.96	0.85–1.10	.573
No diagnosis vs nonpsychotic unipolar depression	0.95	0.88–1.02	.128
Period × psychotic disorders			.020
Period × no diagnosis vs psychotic disorders	0.95	0.77–1.19	.679
Period × no diagnosis vs nonpsychotic unipolar depression	1.17	1.05–1.30	.006

Abbreviations: gFOBT, guaiac fecal occult blood testing; FIT, fecal immunochemical testing; HR, hazard ratio; CI, confidence interval.

Table 3.

Cox Proportional Regression Among the FIT Period.

	HR	95% CI	*P*
Diagnostic category			<.001
No diagnosis vs psychotic disorders	1.05	0.88–1.25	.615
No diagnosis vs nonpsychotic unipolar depression	1.18	1.09–1.28	<.001
Interactions			
Age	1.04	1.04–1.04	<.001
Diagnostic category × Age			.123
Age × No diagnosis vs psychotic disorders	0.98	0.96–1.00	.054
Age × No diagnosis vs nonpsychotic unipolar depression	1.00	0.99–1.02	.522
Female	1.04	1.00–1.07	.056
Diagnostic category × gender			.076
Gender × no diagnosis vs psychotic disorders	0.73	0.51–1.04	.086
Gender × no diagnosis vs nonpsychotic unipolar depression	1.15	0.95–1.38	.146
White	1.02	0.94–1.10	.627
Diagnostic category × white			.833
White × no diagnosis vs psychotic disorders	0.86	0.61–1.37	.660
White × no diagnosis vs nonpsychotic unipolar depression	0.92	0.43–1.70	.672
Length of health system membership	1.01	1.01–1.01	<.001
Diagnostic category × length			.875
Length × no diagnosis vs psychotic disorders	1.00	0.98–1.01	.796
Length × no diagnosis vs nonpsychotic unipolar depression	1.00	0.99–1.01	.651
Number of medications	1.04	1.03–1.04	<.001
Diagnostic category × number of medications			.975
Number of meds × no diagnosis vs psychotic disorders	1.00	0.97–1.03	.851
Number of meds × no diagnosis vs nonpsychotic unipolar depression	1.00	0.98–1.01	.895
Body mass index	1.00	1.00–.99	.074
Diagnostic category × body mass index			.478
Body mass index × no diagnosis vs psychotic disorders	0.99	0.99–0.97	.253
Body Mass Index × no diagnosis vs nonpsychotic unipolar depression	1.00	1.00–.99	.706

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	HR	95% CI	*P*
Has a primary care physician	1.00	0.92–1.09	.985
Diagnostic category × has a primary care physician			.656
Has a primary care physician × No diagnosis vs psychotic disorders	2.48	0.35–17.78	.365
Has a primary care physician × No diagnosis vs nonpsychotic unipolar depression	0.95	0.47–1.91	.881
Primary care physician visits	1.59	1.53–1.65	.000
Diagnostic category × primary care physician visit			.116
Primary care physician visit × No diagnosis vs psychotic disorders	0.84	0.59–1.20	.342
Primary care physician visit × no diagnosis vs nonpsychotic unipolar depression	0.85	0.73–1.01	.062
Medical specialty visits	1.50	1.44–1.56	<.001
Diagnostic category × medical specialty visits			.493
Medical specialty × no diagnosis vs psychotic disorders	0.80	0.56–1.15	.234
Medical specialty × no diagnosis vs nonpsychotic unipolar depression	0.99	0.84–1.18	.952
Surgical and other specialty visits	1.75	1.68–1.82	<.001
Diagnostic category × surgical and other specialty visits			.767
Surgical × no diagnosis vs psychotic disorders	1.06	0.71–1.57	.782
Surgical × no diagnosis vs nonpsychotic unipolar depression	1.07	0.88–1.31	.498

Abbreviations: HR, hazard ratio; CI, confidence interval; FIT, fecal immunochemical testing.