Lack of Follow-up After Fecal Occult Blood Testing in Older Adults

Inappropriate Screening or Failure to Follow Up?

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Background: It is unclear whether lack of follow-up after screening fecal occult blood testing (FOBT) in older adults is due to screening patients whose comorbidity or preferences do not permit follow-up vs failure to complete follow-up in healthy patients.

Methods: A prospective cohort study of 2410 patients 70 years or older screened with FOBT was conducted at 4 Veteran Affairs (VA) medical centers from January 1 to December 31, 2001. The main outcome measure was receipt of follow-up within 1 year of FOBT based on national VA and Medicare data. For patients with positive FOBT results, age and Charlson comorbidity scores were evaluated as potential predictors of receiving a complete colon evaluation (colonoscopy or sigmoidoscopy plus barium enema), and medical records were reviewed to determine reasons for lack of follow-up.

Results: A total of 212 patients (9%) had positive FOBT results; 42% received a complete colon evaluation within 1 year. Age and comorbidity were not associated with receipt of a complete follow-up, which was similar among patients 70 to 74 years old with a Charlson score of 0 compared with patients 80 years or older with a Charlson score of 1 or higher (48% vs 41%; P=.28). The VA site, number of positive FOBT cards, and number of VA outpatient visits were predictors. Of 122 patients who did not receive a complete follow-up within 1 year, 38% had documentation that comorbidity or preferences did not permit follow-up, and over the next 5 years 76% never received a complete follow-up.

Conclusions: While follow-up after positive FOBT results was low regardless of age or comorbidity, screening patients in whom complete evaluation would not be pursued substantially contributes to lack of follow-up. Efforts to improve follow-up should address the full chain of decision making, including decisions to screen and decisions to follow up.
We assessed the receipt of follow-up during the 1 year after screening FOBT across the VA health care system and Medicare because many elderly veterans use more than 1 VA medical center and most are enrolled in Medicare. We identified follow-up testing in National VA Data Systems and linked Medicare payment data (inpatient and outpatient files) by using In-
Deyo scores were calculated from VA and Medicare inpatient data and linkage to the 2000 US Census. The risk of death from a complete colon evaluation documented during the subsequent 5 years.

In addition, 3 of us (C.M.C., M.A.C., and L.C.W.) reviewed VA electronic medical records independently for documented reasons why a complete colon evaluation was not performed and together grouped the reasons into categories. Any discrepancy in categorization was adjudicated by consensus among the reviewers. Medical record review was also used to determine if patients who did not receive a complete colon evaluation within 1 year went on to have a complete colon evaluation documented during the subsequent 3 years.

**Predictor Variables**

Age was defined on the date of the screening FOBT. Comorbidity was measured using the Deyo adaptation of the Charlson comorbidity index, a summary measure of 19 chronic disease diagnoses from administrative data. The risk of death from an increase of 1 in Charlson comorbidity score is approximately equal to that from an additional decade of age. Charlson-Deyo scores were calculated from VA and Medicare inpatient and outpatient claims during the 12 months before the date of the FOBT.

We also assessed other factors known to influence receipt of follow-up after positive FOBT results (Table 1) using VA and Medicare data and linkage to the 2000 US Census. The committee on human research at the University of California, San Francisco; the committee for research and development at the San Francisco VA Medical Center; and the institutional review board at the Minneapolis VA Medical Center approved the study.

### STATISTICAL ANALYSIS

For all estimates of the cumulative incidence of follow-up testing, we observed patients from the date of their screening FOBT in 2001 until their follow-up test or death or the end of the study period (1 year after the date of the FOBT). Patients were censored at the date of follow-up or 1 year, whichever came first, and deaths were treated as competing risk events. Date of death was obtained from the VA Vital Status File, which is similar to the National Death Index in terms of accuracy and completeness. We estimated unadjusted 1-year cumulative incidence of follow-up, stratified according to screening FOBT result. For patients who had a positive FOBT result, we used Cox regression models to assess the association between baseline characteristics and receipt of a complete colon evaluation. To describe the association of age and comorbidity combined, we determined the cumulative incidence of a complete colon evaluation for patients categorized into 3 subgroups: those aged 70 to 74 years with a Charlson score of 0, who are most likely to benefit from screening and follow-up (7-year mortality, 21%); those aged 80 years or older with a Charlson score of 1 or higher, who are least likely to benefit from screening and follow-up (7-year mortality, 62%; life expectancy, 5.6 years); and everyone else. We used

### Table 1. Characteristics of 2410 Patients, According to Screening Fecal Occult Blood Testing (FOBT) Results

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Positive (n=212)</th>
<th>Negative (n=2001)</th>
<th>Incomplete (n=83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-74</td>
<td>75 (35)</td>
<td>751 (36)</td>
<td>26 (31)</td>
</tr>
<tr>
<td>75-79</td>
<td>93 (44)</td>
<td>860 (41)</td>
<td>30 (36)</td>
</tr>
<tr>
<td>≥80</td>
<td>44 (21)</td>
<td>480 (23)</td>
<td>27 (33)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>211 (100)</td>
<td>2035 (97)</td>
<td>81 (98)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>180 (85)</td>
<td>1858 (89)</td>
<td>60 (72)</td>
</tr>
<tr>
<td>Black</td>
<td>30 (14)</td>
<td>190 (9)</td>
<td>20 (24)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1)</td>
<td>41 (2)</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Charlson score</td>
<td>0, No comorbidity</td>
<td>66 (31)</td>
<td>811 (39)</td>
</tr>
<tr>
<td></td>
<td>1-3, Average comorbidity</td>
<td>119 (56)</td>
<td>1081 (52)</td>
</tr>
<tr>
<td></td>
<td>≥4, Severe comorbidity</td>
<td>27 (13)</td>
<td>199 (9)</td>
</tr>
<tr>
<td>VA outpatient visits, No.</td>
<td>0-3</td>
<td>114 (54)</td>
<td>1339 (64)</td>
</tr>
<tr>
<td></td>
<td>≥4</td>
<td>98 (46)</td>
<td>752 (36)</td>
</tr>
<tr>
<td>Homebound</td>
<td>6 (3)</td>
<td>27 (1)</td>
<td>8 (10)</td>
</tr>
<tr>
<td>Married</td>
<td>145 (69)</td>
<td>1471 (72)</td>
<td>49 (62)</td>
</tr>
<tr>
<td>Lived in ZCTA in which ≥25% of adults have a college education</td>
<td>56 (27)</td>
<td>706 (35)</td>
<td>36 (44)</td>
</tr>
<tr>
<td>Median income of ZCTA, $</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest tertile, ≥29119</td>
<td>51 (25)</td>
<td>706 (34)</td>
<td>37 (45)</td>
</tr>
<tr>
<td>Middle tertile, 21137-29118</td>
<td>75 (36)</td>
<td>666 (33)</td>
<td>18 (22)</td>
</tr>
<tr>
<td>Lowest tertile, ≤21136</td>
<td>79 (39)</td>
<td>673 (33)</td>
<td>27 (33)</td>
</tr>
<tr>
<td>VA site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>57 (27)</td>
<td>891 (42)</td>
<td>22 (27)</td>
</tr>
<tr>
<td>B</td>
<td>119 (56)</td>
<td>588 (28)</td>
<td>34 (41)</td>
</tr>
<tr>
<td>C</td>
<td>21 (10)</td>
<td>305 (15)</td>
<td>12 (14)</td>
</tr>
<tr>
<td>D</td>
<td>15 (7)</td>
<td>307 (15)</td>
<td>15 (18)</td>
</tr>
<tr>
<td>Distance to nearest VA clinic, miles</td>
<td>&lt;10</td>
<td>33 (16)</td>
<td>341 (16)</td>
</tr>
<tr>
<td></td>
<td>10-49</td>
<td>90 (42)</td>
<td>741 (36)</td>
</tr>
<tr>
<td></td>
<td>≥50</td>
<td>89 (42)</td>
<td>1005 (48)</td>
</tr>
</tbody>
</table>

Abbreviations: VA, Veterans Affairs; ZCTA, zip code tabulation area.

a Differences between the group with positive FOBT results and those with incomplete results combined were significant ($\chi^2$ test, $P<.01$) for the characteristics of median income and VA site.

b The FOBT results were missing for 24 patients (1%), which was defined as having VA administrative codes for FOBT at 1 of the 4 VA clinics but no FOBT results in the medical record.

c Patients were categorized as having no clinically significant comorbidity if they had a Charlson-Deyo score of 0, average comorbidity if they had a score of 1 to 3, and severe comorbidity if they had a score of 4 or higher based on a priori cutoffs that have been used in prior studies (Walter et al).

d The number of visits was defined by the number of visits to VA primary care, gastroenterology, or general surgery clinics (clinic codes 301, 303, 305, 306, 307, 309, 312, 321-323, and 401) during the 1 year following FOBT (Walter et al).

e Enrolled in VA Home Based Primary Care on or before the date of their screening FOBT.

f Census data were missing for 2% of patients.

g The distance to the nearest VA clinic was measured as a straight-line distance between the location of the VA clinic and the center of the zip code of the patient’s residence.
Among those who received a complete colon evaluation within the VA, and received no follow-up within 1 year. In addition, only 27 of 83 patients who had an incomplete FOBT result (33%) received any follow-up within 1 year. Repeated FOBT was the most common follow-up test (24%) after an incomplete result. To provide context of background testing rates, even among the 2091 patients with negative FOBT results, 29% received some type of colorectal cancer testing within 1 year (Figure 2).

Table 2 indicates there were no significant age-based, comorbidity, racial/ethnic, or socioeconomic characteristics associated with receiving a complete colon evaluation within 1 year after a positive FOBT result ($P > .05$). However, VA site, number of positive FOBT cards, and number of VA outpatient visits were associated with receipt of a complete colon evaluation. For example, 37 of 109 persons with 1 positive card (34%) received a complete colon evaluation compared with 53 of 103 persons with 2 or 3 positive cards (51%) ($P = .01$). In addition, most patients had opportunities for referral for a complete colon evaluation; the median number of VA outpatient visits within 1 year after a positive FOBT result was 3. A total of 110 of 122 patients who did not receive a complete colon evaluation (90%) had a VA outpatient visit within 1 year (range, 0-15 visits). Eleven patients (9%) who did not receive a complete colon evaluation died within 1 year of their positive FOBT result.

Evaluating the combined effect of age and comorbidity, the incidence of a complete colon evaluation within 1 year of a positive FOBT result was similar among the 46 patients 70 to 74 years old with a Charlson score of 0 compared with the 29 patients 80 years or older with a Charlson score of 1 or higher (48% vs 41%; $P = .28$). Only 18 patients (8%) received a complete colon evaluation within 60 days of a positive result (Figure 3).

**RESULTS**

**PATIENT CHARACTERISTICS**

Table 1 shows the characteristics of the 2410 patients in our cohort, stratified according to their FOBT result. Overall, 23% of patients were 80 years or older. Consistent with an elderly veteran population, 98% were men and 88% were white. A total of 212 patients (9%) had a positive FOBT result; 2091 (91%) had a negative FOBT result, and 83 (3%) had an incomplete FOBT result. A total of 106 patients (4%) died within 1 year of their screening FOBT.

Patients with positive FOBT results were more likely to have had their FOBT performed at site B. At site B, 16% of screened patients had a positive result compared with 5% to 6% of patients screened at the other VA facilities. A total of 109 patients with a positive FOBT result (51%) had 1 positive card, 53 (25%) had 2 positive cards, and in 50 (24%) all 3 cards were positive.

**INCIDENCE OF FOLLOW-UP TESTING**

Of the 212 patients with positive FOBT results, only 90 (42%) received a complete colon evaluation within 1 year; 47 (22%) received an evaluation within 6 months. Eight-six patients received a colonoscopy, and 4 received a barium enema plus sigmoidoscopy. Fifty-eight (27%) received a complete colon evaluation within the VA, and 32 (15%) received this follow-up through Medicare. Among those who received a complete colon evaluation within 1 year, the mean (SD) time to follow-up was 192 (91) days within the VA and 119 (90) days for those who went outside the VA for follow-up through Medicare ($P < .001$). A total of 122 patients (58%) did not receive a complete colon evaluation. Overall, 4 (2%) received a barium enema alone, 11 (5%) received a sigmoidoscopy alone, 30 (14%) received a repeated FOBT, and 77 (36%) received no follow-up within 1 year. In addition, only 27 of 83 patients who had an incomplete FOBT result (33%) received any follow-up within 1 year. Repeated FOBT was the most common follow-up test (24%) after an incomplete result. To provide context of background testing rates, even among the 2091 patients with negative FOBT results, 29% received some type of colorectal cancer testing within 1 year (Figure 2).

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**DOCUMENTED REASONS FOR LACK OF COMPLETE COLON EVALUATION AFTER POSITIVE FOBT RESULTS**

Among the 122 patients with a positive FOBT result who did not receive a complete colon evaluation within 1 year,
The most common findings in VA medical records were lack of any acknowledgment of the positive FOBT result in progress notes (43%) and patient refusal of colonoscopy (26%). Patients whom clinicians documented as refusing colonoscopy or having severe health problems or other miscellaneous problems that did not permit complete colon evaluation (Table 3) were classified as having been inappropriately screened (38%).

Patients who failed to receive a complete colon evaluation for other reasons listed in Table 3 (62%) were classified as having failed to complete follow-up. Only 29 patients who did not receive a complete colon evaluation within 1 year (24%) went on to have a complete colon evaluation documented during the next 5 years.

We found that many veterans 70 years or older are not receiving any follow-up after incomplete or positive screening FOBT results. In addition, while 64% of elderly veterans with positive FOBT results received some type of follow-up within 1 year, only 42% received a complete colon evaluation. The cumulative incidence of complete colon evaluation after a positive result was low regardless of age or comorbidity. Instead, other factors, such as VA site, number of positive FOBT cards, and number of VA outpatient visits, were predictive of receiving a complete colon evaluation, although the incidence never exceeded 60%. Also, medical chart documentation indicated that patients who should not have been screened in the first place accounted for 38% of older patients who did not receive a complete colon evaluation within 1 year, and most patients (>75%) who did not receive a complete colon evaluation in the first year never did receive a complete follow-up, even during the next 5 years.

Low rates of follow-up after a positive screening FOBT result are found in many health care systems, with most studies showing that less than 60% of older patients receive a complete colon evaluation within 1 year.9-13,15-17,19,28 Despite this widespread problem, previous studies have
Table 3. Reasons Documented in the VA Electronic Medical Record for Lack of Complete Colon Evaluation After a Positive Screening FOBT Result Among 122 Persons 70 Years or Older

<table>
<thead>
<tr>
<th>Reason</th>
<th>Incidence, No. (%)</th>
<th>Problem^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinician progress notes lacked acknowledgment of the positive FOBT result</td>
<td>53 (43)</td>
<td>Failure to complete follow-up</td>
</tr>
<tr>
<td>Patient refused colonoscopy</td>
<td>32 (26)</td>
<td>Inappropriately screened</td>
</tr>
<tr>
<td>Patient experienced colonoscopy scheduling delays</td>
<td>14 (12)</td>
<td>Failure to complete follow-up</td>
</tr>
<tr>
<td>Patient had severe health problems which made follow-up inappropriate^b</td>
<td>12 (10)</td>
<td>Inappropriately screened</td>
</tr>
<tr>
<td>Patient did not follow dietary restrictions or had active hemorrhoids</td>
<td>6 (5)</td>
<td>Failure to complete follow-up</td>
</tr>
<tr>
<td>Clinician documented miscellaneous reasons for why complete colon evaluation was not pursued (eg, “patient is too old,” “patient not due for colonoscopy for another 3 years,” and “past surgery would make endoscopy difficult”)</td>
<td>3 (2)</td>
<td>Inappropriately screened</td>
</tr>
<tr>
<td>Patient told VA clinician they received colonoscopy outside the VA but had no evidence of having a colonoscopy in Medicare claims</td>
<td>2 (2)</td>
<td>Failure to complete follow-up</td>
</tr>
</tbody>
</table>

Abbreviations: FOBT, fecal occult blood testing; VA, Veterans Affairs.

^aPatients who had medical chart documentation that they refused or had long-standing health problems that did not permit follow-up of positive FOBT results were categorized as “inappropriately screened.” Patients for whom age, health problems, or preferences were not documented as contraindications to follow-up were categorized as “failure to complete follow-up.”

^bDocumented health problems included New York Heart Association class III or IV heart failure (symptoms of shortness of breath with daily activities or at rest), metastatic cancer being palliated (eg, renal cell carcinoma, hepatocellular carcinoma), recent stroke, oxygen-dependent chronic obstructive pulmonary disease, and dementia. Two patients died within 3 months of their screening FOBT (Singh et al^20). not determined the extent to which lack of follow-up is due to screening patients whose age, comorbidity, or preferences would not permit a complete colon evaluation. Findings from previous studies have been mixed regarding the effect of age and comorbidity on receipt of a complete colon evaluation after positive FOBT results, they have been limited by narrow geographic area or included FOBT performed for nonscreening purposes, and prior VA studies have not included follow-up outside the VA.10-13,15-20 Novel aspects of our study are that we used a geographically diverse screened population and its spectrum of FOBT results (eg, number of positive cards, incomplete tests) and identified follow-up using objective real-world data, including claims data from outside the VA through Medicare, which accounted for 15% of complete colon evaluations.

While we found that age and comorbidity were not associated with receipt of a complete colon evaluation after positive FOBT results, 38% of patients without a complete follow-up had medical chart documentation that they refused follow-up or had long-standing health problems that did not permit follow-up. We also found that among patients without a complete follow-up within 1 year, less than 25% received a complete follow-up even over the subsequent 5 years. This suggests screening patients in whom a complete colon evaluation would never be pursued substantially contributes to lack of follow-up among older patients. This may be explained in 2 possible ways. First, a discussion about the need to follow up a positive result with colonoscopy may not happen at the time of screening. Prior studies have shown that clinicians often fail to discuss key information about colorectal cancer screening with patients, especially the risks of follow-up procedures.30,31 Second, previous studies have shown that FOBT screening is poorly targeted to healthy older patients for many reasons, including quality indicators that often promote screening regardless of comorbidity or preferences.7,32

Failure to complete follow-up in older patients for whom age, comorbidity, or preferences were not documented as contraindications to follow-up was also common (62% of patients). In fact, 43% of patients who did not receive a complete colon evaluation lacked acknowledgment of the positive FOBT result in progress notes, suggesting that clinicians may not have known about these results. In addition, clinicians were less likely to complete follow-up if only 1 FOBT card was positive or if a patient reported not following dietary instructions. However, guidelines recommend a complete colon evaluation if any FOBT card is positive.4,5 Similarly, dietary indiscretion is not a reason to avoid follow-up.33 Also, access to timely colonoscopy may be difficult at some VA facilities if the number of gastroenterologists is low or the rate of positive FOBT is especially high, such as site B, which used a more sensitive FOBT than the other facilities. Conversely, some facilities, such as sites A and C, had electronic data systems that informed clinicians of screening results and tracked endoscopy procedures, which increased follow-up.34,35

While increasing use of electronic reminder and notification systems for positive FOBT results has led to some increases in the percentage of patients undergoing a complete colon evaluation in both the VA and integrated health systems,19,34,35 these likely encourage follow-up in all patients indiscriminately, despite substantial differences in potential benefits and risks. Our findings that a substantial number of older patients should not have been screened in the first place suggest that interventions mandating follow-up may have the unintended consequence of worsening quality of care in these patients. In addition, the number of positive FOBT cards, VA facility, and number of visits should not be the major predictors of follow-up. Rather, quality improvement initiatives should encourage clinicians to weigh risks and benefits at each step in the screening process, in the context of a patient’s age, comorbidity, and preferences.36 Our study has several limitations. Although we supplemented 2 national claims databases with medical chart review, we may have missed some tests performed outside the VA system, as Medicare does not capture tests
paid for privately and Medicare claims are not reliably reported for patients enrolled in Medicare Managed Care so they were excluded from our study. Second, as our study predates quality improvement efforts initiated at the VA in 2005, current patterns may be different. However, a prior study found that follow-up has not been increasing over time (1991-2006), and even in 2007 less than a third of patients received a complete colon evaluation within 60 days of a positive FOBT result, suggesting that problems with follow-up persist. Third, while our study included over 2400 patients screened with FOBT, only 212 had a positive result, which may have limited our power to detect small differences between predictors of follow-up. Fourth, medical records sometimes lack details about why a patient refused or did not receive follow-up. However, the medical record is the official document of the follow-up decision that was actually made. This is an advantage over using clinician self-report, which may not represent real-world decision-making in a busy practice setting. Fifth, our cohort primarily comprised men who use the VA, so the generalizability of our findings to persons who do not use the VA is uncertain. Yet, understanding follow-up within the VA is important in its own right, because the VA is the largest health care system in the United States and a leader in improving health care quality.

In conclusion, low follow-up rates after a positive FOBT result are seen regardless of whether patients are 70 to 74 years old without comorbidity or 80 years or older with comorbidity. These findings argue against the approach of screening indiscriminately with FOBT and then targeting follow-up based on age and comorbidity since, like colorectal cancer screening, FOBT follow-up in older adults is not well targeted. Medical chart documentation indicates that failure to complete follow-up is due to problems with screening patients in whom follow-up is not appropriate as well as failing to complete follow-up in patients who should have received follow-up. Quality improvement initiatives should encourage individualized screening decisions in older patients and facilitate timely follow-up of positive FOBT results in patients whose comorbidity and preferences make follow-up appropriate.

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Author Contributions: Dr Walter had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Carlson and Walter. Acquisition of data: Carlson, Casadei, Partin, and Walter. Analysis and interpretation of data: Carlson, Kirby, Kistler, and Walter. Drafting of the manuscript: Carlson, Kirby, and Walter. Critical revision of the manuscript for important intellectual content: Carlson, Casadei, Partin, and Kistler. Statistical analysis: Kirby and Kistler. Obtained funding: Walter. Administrative, technical, and material support: Casadei, Partin, and Walter.

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