

History of Visible Rectal Bleeding in a Primary Care Population

Initial Assessment and 10-Year Follow-up

Mark Helfand, MD, MS; Keith I. Marton, MD; Melanie J. Zimmer-Gembeck, MS; Harold C. Sox, Jr, MD

Objective.—To determine whether a complaint of visible rectal bleeding that is elicited by a screening review of systems merits investigation and to assess the accuracy of a defined protocol to evaluate bleeding.

Design.—Prospective cohort study.

Setting.—Primary care clinics in a veterans medical center.

Patients.—We used an 8-item review of systems to identify 297 individuals with visible rectal bleeding; 201 (68%) of these individuals completed a specified protocol consisting of double-contrast barium enema (DCBE) examination, rigid sigmoidoscopy, and follow-up visit after 6 to 12 months. Ten years later we verified the diagnosis in 131 (93%) of 141 patients whose initial evaluation suggested no cause, or a benign anorectal cause, of bleeding.

Main Outcome Measures.—Final diagnoses after 2 and 10 years; sensitivity and specificity of symptoms, DCBE, and rigid sigmoidoscopy.

Results.—We diagnosed serious disease in 48 (24%) of the 201 patients; 26 had polyps, 9 had inflammatory bowel disease, and 13 (6.5%) had colon cancer. Symptoms did not predict the diagnosis. Neither DCBE nor rigid sigmoidoscopy alone was sufficiently sensitive to be used alone, but the combination of DCBE and rigid sigmoidoscopy had a sensitivity of 0.96 and a specificity of 0.76 for the diagnosis of polyps, cancer, or inflammatory bowel disease.

Conclusions.—Self-reported rectal bleeding detected by means of a review of systems was associated with a high likelihood of important pathology. Physicians should ask all adults about visible rectal bleeding and should visualize the entire colon in those who report bleeding.

JAMA. 1997;277:44-48

VISIBLE RECTAL BLEEDING is a fairly common occurrence in the general population. About 3% of the general population report seeing blood in the toilet bowl, and between 12% and 15% report

blood on the toilet paper within the previous 6 months.¹⁻⁴ The approaches of primary physicians to rectal bleeding vary. Physicians often rely on the history and physical examination to distinguish minor anal bleeding from more serious causes.⁵ Recent studies do not agree on the value of history and symptoms to decide which patients should undergo a full evaluation of the colon.⁵⁻⁸

Another area of uncertainty is whether or not to ask about blood with stools or on the toilet paper at a periodic health examination. Most individuals who have noticed bleeding, including many at high risk of neoplasia, do not mention their

symptoms to a physician.^{3,9,10} In a recent survey, only 41% of all respondents with self-reported rectal bleeding had consulted a physician for the problem.³ The authors of that study hypothesized that asking all patients about rectal bleeding might be useful. However, the utility of asking about bleeding in patients seeing a primary physician for other reasons has not been studied.

To address these uncertainties, we undertook a 10-year prospective study to develop a strategy for detecting and evaluating nonemergent visible rectal bleeding in a primary care clinic. Specifically, our goals were (1) to determine whether a complaint of visible rectal bleeding that is elicited by a screening review of systems merits an aggressive investigation; and (2) to examine the value of specific features of the history, physical examination, radiologic, and endoscopic evaluation for the diagnosis of serious diseases that are associated with bleeding.

METHODS

Recruitment and Data Collection

Patients were recruited between January 1981 and October 1983 from the walk-in and general medical clinics of the Veterans Affairs Medical Center, Palo Alto, Calif. After measuring vital signs, nursing personnel asked each patient to complete a short questionnaire. On this questionnaire patients reported whether they had any of 8 symptoms during the last 3 months. These symptoms included red blood in the stool or on the toilet paper, as well as 7 unrelated symptoms. Patients were also asked if they had sought medical attention or were planning to seek medical attention for any of the symp-

From the Department of Medicine, Portland Veterans Affairs Medical Center, and the Biomedical Information Communication Center, Oregon Health Sciences University, Portland (Dr Helfand); Department of Medicine, St Marys Medical Center, San Francisco, Calif (Dr Marton); Biomedical Information Communication Center, Oregon Health Sciences University (Ms Zimmer-Gembeck); and the Department of Medicine, Dartmouth Medical School, Hanover, NH (Dr Sox).

Reprints: Mark Helfand, MD, MS, Oregon Health Sciences University, BICC-504, 3181 SW Sam Jackson Park Rd, Portland, OR 97201-3098.

toms. If the patient noted blood in the stool or on the toilet paper in the last 3 months, and had not sought medical attention for this problem, the nurse contacted the study research assistant. The assistant then approached each patient about participation in the study.

After agreeing to participate by signing a consent form that had been approved by the Stanford University Committee on Protection of Human Subjects in Research, patients completed a questionnaire concerning their history of bleeding, gastrointestinal illnesses, and any other intestinal symptoms. The research assistant asked each patient to apply a small sample of stool to 2 fecal occult blood test cards (Hemoccult II, Smith Kline Diagnostics, Sunnyvale, Calif) each day for 3 days. Each patient was seen within 1 week of entry into the study by an investigator (K.I.M. or H.C.S.) who performed an anoscopic examination and a rigid sigmoidoscopy. Lesions identified at sigmoidoscopy were biopsied. Each patient also underwent a double-contrast barium enema (DCBE) radiographic examination. Results of rectal examination, anoscopy, rigid sigmoidoscopy, and DCBE were recorded as follows:

Rectal Examination.—The examiner recorded visualization of external hemorrhoidal tags, palpation of a mass or internal hemorrhoid, and tenderness.

Anoscopy.—The examiner recorded direct visualization of a fissure, bleeding hemorrhoid, or nonbleeding hemorrhoid, as well as the presence of inflammation or friability.

Rigid Sigmoidoscopy.—Information recorded included the adequacy of preparation, penetration of the sigmoidoscope, visualization of a mass, polyp, ulcer, hemorrhoid or of active bleeding, friability, and the result of a fecal occult blood test taken on a sample through the end of the sigmoidoscope.

Double-Contrast Barium Enema.—After review of the radiologist's final report, one of the investigators recorded the result of each DCBE study as follows:

Significant Finding.—The radiologist's report clearly indicated the diagnosis of a polyp, cancer, or inflammatory bowel disease (IBD).

Abnormality of Unknown Significance.—The radiologist commented on a finding without either indicating that it was of no concern or that it was a definite abnormality. For example, if the radiologist identified an area of narrowing of questionable significance or a possible piece of retained stool (vs a polyp), the finding was classified as an "abnormality of unknown significance."

Abnormality of No Significance.—An abnormality was mentioned and the re-

port stated that the abnormality was of no concern with regard to bleeding, or only noted diverticulosis.

Normal.—No abnormalities were noted and the study was described as technically adequate.

Inadequate.—The study was technically inadequate or incomplete and there was no significant abnormality or abnormality of unknown significance.

Patients who had more than 1 finding were classified according to their most significant abnormality. When possible, inadequate sigmoidoscopic and DCBE examinations were repeated and the results of the repeat examination were recorded.

When the initial evaluation was completed, the examiner made a preliminary diagnosis and plan. Patients with serious abnormalities identified either on rigid sigmoidoscopy or on DCBE were referred to a gastroenterologist (if colonoscopy was deemed necessary) or to a general surgeon (if surgery was indicated). If hemorrhoids, a fissure, or no abnormality was found, the patient was treated with local therapy (eg, sitz baths, suppositories) for 1 month. If the bleeding was no better after 1 month, or if an adequate rigid sigmoidoscopy and DCBE had not been performed, the patient was referred for colonoscopy.

Follow-up

Patients were contacted 1, 6, and 12 months after entry into the study to assess symptom status and diagnosis. Patients who did not complete at least 1 of the 6- or 12-month follow-up visits were excluded from the final sample. At the last evaluation, a diagnosis was assigned by 1 of the investigators (K.I.M. or H.C.S.) using all available data after the last of these contacts (mean, 11.6 months; range, 3-31 months). Each patient was assigned 1 of the following diagnoses: (1) cancer of the colon, (2) benign neoplastic cause of bleeding (polyps), (3) IBD, (4) benign anorectal cause of bleeding (eg, hemorrhoids, fissure), or (5) none or unknown cause. If a patient had 2 causes of bleeding, he or she was assigned to the more serious category.

We examined medical records of patients in the final sample 8 to 10 years after entry into the study. Medical records included paper records at the Palo Alto Veterans Affairs Medical Center, as well as computerized records contained in the Department of Veterans Affairs national database housed in Austin, Tex. Endoscopy and pathology reports were retrieved from records of the gastroenterology and pathology departments at the Palo Alto Veterans Affairs Medical Center. Additionally, the Department of Veterans Affairs Benefits Registry and the National Death Index were queried

to determine vital status. Copies of all death certificates were obtained from state and local vital statistics records. In some cases, we contacted the patient (or their next of kin) by telephone to ascertain symptoms, tests performed, and diagnoses made since the last contact with study personnel.

Study End Points

We used the follow-up data to determine whether the diagnosis assigned by the investigators at the last follow-up visit was correct. The diagnoses of a benign anorectal or an unknown cause were considered to be incorrect if a diagnosis of cancer, polyps, or IBD was made within 2 years of the patient's entry into the study. Patients were grouped into 3 categories according to the corrected final diagnosis. The "serious" group included patients with a diagnosis of cancer, polyps, or IBD. The "anorectal" group included patients with a diagnosis of hemorrhoids or fissure, and the "none" group included patients in which no cause of lower gastrointestinal bleeding was found. We used the corrected final diagnosis as the criterion standard to assess the performance of clinical findings and diagnostic test results in predicting the cause of bleeding.

We also used the follow-up data to determine the long-term probability of developing serious colorectal disease in patients who were diagnosed to have anorectal disease, or who had no evident cause of bleeding, during the initial study period.

Data Analysis

Relation of Patient Characteristics to End Points.—Patient characteristics within each diagnostic group (serious, anorectal, and none) were compared using χ^2 analysis (if the patient characteristic was nominally scaled) or unpaired *t* tests and analysis of variance (if the patient characteristic was intervally scaled). Stepwise logistic regression was used to examine the ability of combinations of patient characteristics to predict the corrected final diagnosis.

Test Performance.—We calculated sensitivity, specificity, and likelihood ratios (LRs) of DCBE and rigid sigmoidoscopy, singly and in combination, for serious causes of rectal bleeding. Sensitivity was calculated as the number of patients who had a corrected final diagnosis of cancers, polyps, and IBD, and who also had an abnormal test, divided by the number of patients who had a diagnosis of 1 of these conditions within 2 years of entering the study. Specificity was the proportion of patients who did not have one of these conditions and who also had a nega-

Table 1.—Patient Characteristics and Symptoms by Diagnosis*

Patient Characteristic or Symptom	Diagnostic Category			P †
	None (n=49)	Anorectal (n=104)	Serious (n=48)	
Mean (± 1 SD) age, y	53.8 (± 15.4)	54.6 (± 13.6)	58.3 (± 11.3)	.08
Age <40 y, frequency (%)	11 (22)	23 (22)	4 (8)	.02
Duration of bleeding >6 mo, No. (%)	23 (47)	65 (64)	20 (42)	.04
Duration of bleeding <2 mo, No. (%)	13 (27)	18 (18)	21 (44)	.002
Frequency of bleeding > once per week, No. (%)	21 (44)	53 (52)	29 (60)	.19
Bleeding has recently worsened, No. (%)	9 (18)	40 (38)	10 (21)	.13
No. of stools per day, mean (± 1 SD)	1.4 (± 0.9)	1.5 (± 0.8)	1.6 (± 1.4)	.56
Weight loss >4.5 kg, No. (%)	9 (18)	13 (13)	4 (8)	.26
Nature of bleeding, frequency (%)				
On toilet paper	45 (98)	97 (98)	45 (96)	.44
Colors toilet water	33 (73)	77 (79)	35 (81)	.58
Mixed with or on stool	32 (65)	67 (64)	38 (79)	.05
Clots visible	4 (9)	30 (34)	11 (26)	.10
Mucus in stool	11 (22)	19 (18)	8 (17)	.65
Positive test for occult blood	9 (20)	23 (28)	16 (44)	.008
Nature of stools, frequency (%)				
Loose	23 (52)	55 (64)	25 (60)	.96
Painful defecation	21 (47)	48 (55)	11 (28)	.005
Recent change in frequency	14 (29)	26 (25)	14 (29)	.72
Recent change in appearance	15 (31)	27 (26)	18 (38)	.16
Any recent change in bowel habits	23 (47)	39 (38)	23 (48)	.37
Abdominal pain with bowel movements	17 (35)	41 (39)	10 (21)	.02

*Not all patients responded to all questions. N ranges from 163 to 201. One patient was female (0.5%).

†The serious group was compared to other groups using Pearson χ^2 or t test.

tive test (or tests). The likelihood ratio for a positive test (LR+) was the proportion of patients with serious disease who had a positive test, divided by the proportion of patients with no serious disease who had a positive test.¹¹ The likelihood ratio for a negative test (LR-) was the proportion of patients with serious disease who had a negative test, divided by the proportion of patients with no serious disease who had a negative test (or tests).

RESULTS

Patients

A total of 297 individuals reported rectal bleeding and consented to participate. These patients were then invited to return for a DCBE and rigid sigmoidoscopy. Fifty-one patients (17%) did not return for either examination, 23 had rigid sigmoidoscopy only, and 1 had a DCBE only. Of the remaining 222 patients, 21 did not complete a follow-up interview and could not be assigned a final diagnosis. Thus, we excluded a total of 96 (32%) patients. The final study population included 201 patients who completed the entire protocol including DCBE examination, rigid sigmoidoscopy, and a 6- or 12-month interview. Two hundred of the patients were male.

Of the 45 excluded individuals who had completed at least 1 test, 6 had evidence of polyps on rigid sigmoidoscopy (13.3%), and another 3 had unconfirmed evidence of polyps on DCBE.

Short-term Outcome of Rectal Bleeding Detected by a Review of Systems

Of the 201 patients who completed the specified protocol, the investigators diagnosed 47 with serious gastrointestinal disease. One additional patient whose diagnosis was recorded as "none" had cancer on a colonoscopy performed at another institution 20 months after enrollment. Of the 48 patients (24%) diagnosed with serious disease, 26 had polyps, 9 had IBD, and 13 (6.5%) had colon cancer. Eight of the malignancies were located in the rectosigmoid region, 4 were located in the cecum or ascending colon, and in 1 patient, the location was not recorded. Two patients had distant metastases (Dukes stage D), and, of the remaining cancers, 1 was Dukes stage A, 6 were stage B, and 4 were stage C. In 15 of the 26 patients with polyps, at least 1 lesion was larger than 1 cm.

Long-term Outcomes of Undiagnosed Rectal Bleeding

During the initial study period, 141 patients had a final diagnosis of anorectal disease or no evident cause of bleeding, and had no findings suggestive of serious disease on rigid sigmoidoscopy or DCBE. We obtained follow-up information for 131 (93%) of these patients. Between 2 and 10 years after entering the study, 3 (2.3%) patients developed rectal or colon cancer and 6 (4.6%) developed polyps. After ad-

justment for age and sex, the 10-year incidence of cancer was not statistically different than the expected incidence in a similar cohort of the general population,¹² but the trend was toward a higher incidence (2.3% vs 1.2%, $P>.4$). There was also a trend for patients with continued or recurrent bleeding during the follow-up period to develop neoplasia (11% vs 5%), but this difference was consistent with chance ($P=.20$).

Relation Between Patient Characteristics and Cause of Rectal Bleeding

We hoped that we could use clinical findings to identify patients who, because they were at low risk of serious disease (cancer, polyps, or IBD), did not require further diagnostic evaluation. To our disappointment, clinical findings were not good predictors of the diagnosis (Table 1). Of the factors examined, only older age, shorter duration of bleeding, and blood mixed with stool were associated with a serious cause of rectal bleeding. Fecal occult blood testing was completed on 163 patients. In these patients, the sensitivity of the test for serious disease was 0.44 and the specificity was 0.81. Sixteen patients out of 36 with positive fecal occult blood tests proved to have serious disease (positive predictive value, 0.44). Six (16%) of 37 patients who had clear evidence of bleeding from fissures or hemorrhoids on anoscopy also had cancer (1 patient) or polyps (5 patients). After trying various combinations of the clinical and anoscopic findings, including fecal occult blood test results, it was not possible to identify a group of 15 or more patients whose risk of serious conditions was lower than 7%.

Two clinical predictors—age and duration of bleeding less than 2 months—had statistically significant associations with the diagnosis of cancer. No cancers were diagnosed among the 58 patients who were younger than 50 years, but 7 (12%) of these individuals had polyps or IBD. Among the 143 patients older than 50 years, the risk of cancer was higher when bleeding had been present for less than 2 months (18% vs 6%, $P=.03$), but 6 of the 13 cancers occurred in individuals who had bleeding longer than 2 months. A recently published clinical prediction rule used age by decade, change in bowel habits, and blood in or on the stool to predict the probability of cancer in patients with rectal bleeding.⁷ Except for age, these predictors were not associated with cancer in our population. When applied to our data, this rule had a sensitivity of 54%, a specificity of 56%, and a LR+ of 1.2.

Yield of Diagnostic Tests

Technical Performance.—Full penetration (25 cm) of the rigid sigmoido-

Table 2.—Yield of Alternative Diagnostic Strategies in 201 Patients

Decision Criteria*	No. of Patients Correctly Diagnosed				Sensitivity for Serious Conditions	No. of Patients Without Serious Disease Referred for Colonoscopy	Specificity	Likelihood Ratio Positive	Likelihood Ratio Negative
	Cancers (n=13)	Polyps (n=26)	Inflammatory Bowel Disease (n=9)	Total With a Serious Condition (n=48)					
A. Significant finding on DCBE	9	13	3	25	0.52	3	0.98	26.6	0.49
B. Significant finding or abnormality of unknown significance on DCBE	12	15	6	33	0.69	35	0.77	3.0	0.41
C. Significant finding on rigid sigmoidoscopy	10	16	7	33	0.69	7	0.95	4.7	0.10
D. Significant finding or abnormality of unknown significance on DCBE or a significant finding on rigid sigmoidoscopy†	13	25	8	46	0.96	37	0.76	4.0	0.05

*Classification of DCBE findings is discussed in text. DCBE indicates double-contrast barium enema.

†Positive sigmoidoscopy is defined as a mass, polyp, or mucosal friability.

scope occurred on the first attempt in 117 (58%) of the 201 patients. Sixty-two (31%) of the 201 patients underwent a second sigmoidoscopy because of an inadequate initial examination. We referred 22 patients (11%) directly to colonoscopy or surgery after sigmoidoscopy revealed an obstruction or cancer. A repeat DCBE examination was recommended in 10 patients (5%). After the initial evaluation, 20 patients (10%) were referred to a surgeon, most often for severe anorectal disease. Fifty-one patients (25%) were referred to a gastroenterologist for colonoscopy, but because of noncompliance only 35 colonoscopies were performed.

Sensitivity, Specificity, and LRs.—We evaluated the sensitivity of several criteria for referring patients for colonoscopy. Table 2 shows the number of patients with serious disease correctly diagnosed and the number of false-positive results when an abnormal DCBE or rigid sigmoidoscopy were the criteria for referral for colonoscopy. If a significant finding on DCBE were the only criterion for referral for colonoscopy (criterion A in Table 2), 25 of 48 patients with serious conditions—9 patients with cancer, 13 with polyps, and 3 with IBD—would be diagnosed correctly. Three patients of the 153 with a diagnosis of “anorectal” or “none” also had a significant finding on DCBE. Therefore, for criterion A, the sensitivity of an abnormal DCBE, was 0.52 and the specificity was 0.98. The DCBE was more sensitive (0.69) if the criteria for referral for colonoscopy included “abnormalities of unknown significance” on DCBE (criterion B). Rigid sigmoidoscopy alone had a sensitivity of 0.69 and a specificity of 0.95.

For the combination of DCBE and rigid sigmoidoscopy (criterion D), a patient was considered to have a positive examination if he had an abnormal DCBE (including an abnormality of unknown significance) or an abnormal rigid sigmoidoscopy. Criterion D was highly sensitive (0.96) and reasonably specific (0.76) for serious disease. Overall, 46 of 83 patients who had an abnormality on DCBE or rigid sigmoido-

scopy proved to have serious disease (positive predictive value=0.55). The LR+ for the criterion D was 4.0, which means that the probability of an abnormality on DCBE or rigid sigmoidoscopy is 4 times higher in patients with a serious cause of bleeding than in a patients with a nonserious cause of bleeding. The LR− for criterion D was 0.05, which means that the probability of having both a normal DCBE and a normal rigid sigmoidoscopy in patients with serious disease is much smaller (5%) than the chance of normal examinations in patients without a serious cause of bleeding.

COMMENT

In this prospective study, self-reported rectal bleeding detected by means of a short review of systems was associated with a high likelihood of important pathology. Nearly 1 in 5 patients with visible rectal bleeding had neoplasia or IBD. At least half of the cancers were detected in a stage in which intervention is thought to confer a significant benefit.

Our results indicate that patients with rectal bleeding deserve thorough evaluation. Primary care physicians often defer evaluation, or perform flexible sigmoidoscopy alone, if the history suggests bleeding from an anorectal source.^{4,6} We were unable to use features of the history and anoscopic examination to reliably sort patients into the major diagnostic categories. The yield of serious disease was substantial even among patients with clear evidence of anorectal disease. If used alone, flexible sigmoidoscopy might detect more polyps than rigid sigmoidoscopy. However, 3 of the 13 cancers we found were beyond the reach of the flexible sigmoidoscope, suggesting that flexible sigmoidoscopy alone is inadequate for the evaluation of rectal bleeding.

Our study also provides direct evidence about the effectiveness of a defined strategy for determining when the results of DCBE plus rigid sigmoidoscopy should prompt colonoscopy. Overall, 96% of patients with serious disease, including all

13 patients with cancer, had an abnormal DCBE or rigid sigmoidoscopy as defined in the study protocol. Long-term follow-up suggested that rigid sigmoidoscopy and DCBE followed by colonoscopy for selected patients did not miss other patients with cancer, polyps, or IBD.

To our knowledge, this prospective study is the first to assess the diagnostic yield of a specific component of the review of systems, and the first to examine the clinical value of asking about visible rectal bleeding among patients presenting to a primary care physician for unrelated reasons. Two other studies have examined consecutive patients presenting to primary physicians with a complaint of rectal bleeding.^{5,6} In these 2 studies, primary physicians were asked to refer patients who complained of bleeding for participation in the protocol. In 1 of these studies, the authors noted that many physicians preferred to observe patients when the history was suggestive of a benign cause, even though they had been encouraged by the investigators to refer all patients with bleeding to the study.^{6,7} We screened patients directly by means of a review of systems, and did not rely on referrals from primary physicians.

This high rate of serious lesions occurred in a group of patients who, despite an average duration of symptoms of over 6 months, had not complained of rectal bleeding to their physicians. Screening by means of a test for occult blood would have missed almost half of the neoplastic lesions found in this population. Our results suggest that, at least in patient populations similar to ours, one should periodically inquire about recent visible rectal bleeding and that a positive response should trigger a thorough diagnostic evaluation.

This study has several limitations. First, DCBE plus sigmoidoscopy (either rigid or flexible) is less effective than colonoscopy to detect colonic angiodysplasia and polyps smaller than 1 cm. Angiodysplasia is found in about 1% of patients with non-emergent rectal bleeding.^{5,8} Neither rigid

nor flexible sigmoidoscopy is likely to detect these lesions, which are usually located in the right colon or cecum.^{13,15} Diminutive polyps and adenomas are found about twice as often by colonoscopy as by DCBE plus flexible sigmoidoscopy,^{14,15} but their role in bleeding is not certain.¹⁶

Second, about one third of eligible patients with rectal bleeding identified by screening did not complete our protocol. This poor compliance may be due to the difficulty of undergoing 2 invasive procedures, DCBE plus rigid sigmoidoscopy, each of which also entails a bowel preparation that can result in additional work days lost or morbidity. Performing these tests on the same day, or using colonos-

copy as the initial test in all patients, might have improved patient compliance and comfort.^{14,15,17}

Third, our results may not apply to all patient populations. Nearly all of the patients we studied were men, and 80% were over 40 years of age. In addition, because our patients were recruited from a single site, in theory our results could have been affected by local colon cancer screening practices or environmental risk factors for colon neoplasia. A multicenter study would provide useful information about the applicability of our results to other patients.

In summary, this prospective study revealed that asking men visiting a general

medicine clinic a question about visible rectal bleeding identified patients at high risk of serious colon disease. A strategy using DCBE plus rigid sigmoidoscopy detected 96% of patients with serious disease and required relatively few colonoscopies. The main lesson to be learned from our study results is that physicians should ask adult patients about visible rectal bleeding and should visualize the entire colon in those who report bleeding.

This study was supported by a grant from the Central Office HSR&D Program to the Palo Alto Veterans Affairs Medical Center, Palo Alto, Calif. Dr Helfand is a Generalist Physician Scholar of the Robert Wood Johnson Foundation.

References

1. Dent OF, Goulston KJ, Zubrzycki J, Chapuis PH. Bowel symptoms in an apparently well population. *Dis Colon Rectum*. 1986;29:243-247.
2. Silman AJ, Mitchell P, Nicholls RJ, et al. Self-reported dark red bleeding as a marker comparable with occult blood testing in screening for large bowel neoplasms. *Br J Surg*. 1983;70:721-724.
3. Crosland A, Jones R. Rectal bleeding: prevalence and consultation behaviour. *BMJ*. 1995;311:486-488.
4. Fijten GH, Blijham GH, Knottnerus JA. Occurrence and clinical significance of overt blood loss per rectum in the general population and in medical practice. *Br J Gen Pract*. 1994;44:320-325.
5. Goulston KJ, Cook I, Dent OF. How important is rectal bleeding in the diagnosis of bowel cancer and polyps? *Lancet*. 1986;2:261-265.
6. Fijten GH, Muris JWM, Starmans R, Knottnerus JA, Blijham GH, Krebber TF. The incidence and outcome of rectal bleeding in general practice. *Fam Pract*. 1993;10:283-287.
7. Fijten GH, Starmans R, Muris JWM, Schouten

- HJA, Blijham GH, Knottnerus JA. Predictive value of signs and symptoms for colorectal cancer in patients with rectal bleeding in general practice. *Fam Pract*. 1995;12:279-286.
8. Mant A, Bokey EL, Chapuis PH, et al. Rectal bleeding: do other symptoms aid in diagnosis? *Dis Colon Rectum*. 1989;32:191-196.
9. Mitchell TD, Tornelli JT, Fisher TD, Blackwell TA, Moorman, JR. Yield of the screening review of systems: a study on a general medical service. *J Gen Intern Med*. 1992;7:393-397.
10. Boland BJ, Wollan PC, Silverstein MD. Review of systems, physical examination, and routine tests for case-finding in ambulatory patients. *Am J Med Sci*. 1995;309:194-200.
11. Sackett D, Haynes R, Guyatt G, Tugwell P, eds. *Clinical Epidemiology: A Basic Science for Clinical Medicine*. 2nd ed. Boston, Mass: Little Brown & Co Inc; 1991.
12. Eddy DM. Screening for colorectal cancer. In: Eddy DM, ed. *Common Screening Tests*. Philadelphia,

- Pa: American College of Physicians; 1991:286-311.
13. Fouch PG, Rex DK, Lieberman DA. Prevalence and natural history of colonic angiodysplasia among healthy asymptomatic people. *Am J Gastroenterol*. 1995;90:564-567.
14. Irvine EJ, O'Connor J, Frost RA, et al. Prospective comparison of double contrast barium enema plus flexible sigmoidoscopy v. colonoscopy in rectal bleeding. *Gut*. 1988;29:1188-1193.
15. Rex DK, Weddle RA, Lehman GA, et al. Flexible sigmoidoscopy plus air contrast barium enema versus colonoscopy for suspected lower gastrointestinal bleeding. *Gastroenterology*. 1990;98:855-861.
16. Ransohoff DF, Lang CA. Small adenomas detected during fecal occult blood test screening for colorectal cancer: the impact of serendipity. *JAMA*. 1990;264:76-78.
17. Brewster NT, Grieve DC, Saunders JH. Double-contrast barium enema and flexible sigmoidoscopy for routine colonic investigation. *Br J Surg*. 1994;81:445-447.