

Use of fecal occult blood test in hospitalized patients: Survey of physicians practicing in a large central Canadian health region and Canadian gastroenterologists

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BACKGROUND: Although the fecal occult blood test (FOBT) was developed for colorectal cancer screening in the outpatient setting, it continues to be used among hospitalized patients. No previous study has evaluated the knowledge, beliefs and attitudes of practicing physicians on the use of FOBT among hospitalized patients and compared practices among physicians with different medical specialty training.

OBJECTIVE: To survey physicians in the Winnipeg Regional Health Authority (WRHA) and Canadian gastroenterologists (GIs) on the use of FOBT in hospitals.

METHODS: A survey was distributed by e-mail to internists (n=198), emergency medicine (EM) physicians (n=118), general surgeons (n=47) and family medicine (FM) physicians with admitting privileges (n=29) in the WRHA. Canadian GIs were surveyed through the membership database of the Canadian Association of Gastroenterology (CAG) (n=449). The survey included items regarding demographics of the respondents and their current use of FOBT in hospitals.

RESULTS: Response rates ranged from 18% among CAG members to 69% among FM physicians in the WRHA. General internal medicine, general surgeon and GI respondents were less likely to order a FOBT and less likely to believe that an FOBT was useful in assessing emergency room or hospitalized patients when compared with FM and EM respondents (P<0.001). The most common indications for ordering a FOBT were black stools and anemia with and without iron deficiency. Two-thirds of EM physicians preferred point-of-care testing rather than laboratory reporting of FOBT.

CONCLUSIONS: The present survey suggests that FOBTs are commonly used in hospitals by EM and FM physicians for indications such as anemia and black stools.

Key Words: *Fecal immunochemical test; Inpatients; Occult blood; Utilization*

The fecal occult blood test (FOBT) is the most commonly used test for colorectal cancer (CRC) screening in Canada (1). The use of FOBT has been shown to decrease CRC mortality by 15% to 33% in randomized controlled trials (2). Although the FOBT was developed for CRC screening in the outpatient setting, it is used in hospitalized patients (3,4).

L'utilisation de la recherche de sang occulte dans les selles chez les patients hospitalisés : un sondage auprès de médecins exerçant dans une grande région de la santé du centre du Canada et de gastroentérologues canadiens

HISTORIQUE : Même si la recherche de sang occulte dans les selles (RSOS) a été mise au point pour dépister le cancer colorectal en consultations externes, elle continue d'être utilisée auprès des patients hospitalisés. Aucune étude n'a évalué les connaissances, les croyances et les attitudes des médecins en exercice quant à l'utilisation de la RSOS chez les patients hospitalisés et comparé les pratiques entre les médecins ayant diverses formations de spécialité en médecine.

OBJECTIF : Sonder les médecins de la Régie régionale de la santé de Winnipeg (RRSW) et les gastroentérologues (GE) canadiens quant à l'utilisation de la RSOS dans les hôpitaux.

MÉTHODOLOGIE : Le sondage a été distribué par courriel à des internistes (n=198), des médecins d'urgence (MU) (n=118), des chirurgiens généraux (n=47) et des médecins de famille (MF) ayant des privilèges d'hospitalisation (n=29) à la RRSW. Les GE canadiens ont été sondés par l'entremise de la base de données des membres de l'Association canadienne de gastroentérologie (ACG) (n=449). Le sondage incluait des questions sur la démographie des répondants et leur utilisation courante de la RSOS dans les hôpitaux.

RÉSULTATS : Le taux de réponse variait entre 18 % chez les membres de l'ACG à 69 % chez les MF de la RRSW. Les répondants en médecine interne générale, en chirurgie générale et en GE étaient moins susceptibles de demander une RSOS et de la croire utile pour évaluer les patients à l'urgence ou les patients hospitalisés que les MF et les MU (P<0,001). Les principales indications pour demander une RSOS étaient des selles noires et de l'anémie, accompagnées ou non d'anémie ferriprive. Les deux tiers des MU préféraient les tests sur place aux résultats de laboratoire de la RSOS.

CONCLUSIONS : Selon le présent sondage, la RSOS est souvent utilisée dans les hôpitaux par les MU et les MF pour des indications comme l'anémie et les selles noires.

One of the limitations of FOBT is false-positive test results (ie, positive results with no significant colorectal abnormality), which can lead to patient anxiety and stress, as well as further investigations including colonoscopies. In addition, the guaiac FOBT is not specific for blood and depends on the peroxidase activity of hemoglobin. Dietary substances with peroxidase activity, such as plant peroxidases

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TABLE 1
Response rates among the different groups of Winnipeg Regional Health Authority (WRHA) and Canadian Association of Gastroenterology (CAG) physicians surveyed

Medical specialty	WRHA		Province of practice	CAG	
	Physicians surveyed, n	Response rate, n (%) [*]		Physicians surveyed, n	Response rate, n (%) [†]
All specialties	392	125 (32)	All provinces	457	80 (18)
Internal medicine (all)	198	46 (23)	British Columbia	52	12 (23)
General internal medicine	20	13 (65)	Alberta	83	14 (17)
Gastroenterology	12	6 (50)	Saskatchewan/Manitoba	25	6 (24)
Other subspecialties	166	27 (16)	Ontario	201	33 (16)
General surgery	47	13 (28)	Quebec	59	6 (10)
Emergency medicine	118	40 (34)	Atlantic Canada	37	8 (22)
Family medicine	29	20 (69)			

^{*}Six Manitoba respondents did not specify medical specialty; [†]One CAG member respondent did not specify province of practice

and red meat, can lead to positive guaiac FOBTs (5). To avoid these false-positive results, dietary restriction of these substances is recommended three days before collection of the stool samples and/or the test is not developed for three days after the sample collection to allow natural degradation of the plant peroxidases (6). Neither of these approaches is feasible in hospitalized patients because the results would be required quickly when FOBT is used to determine the presence of gastrointestinal bleeding.

Few studies have examined the utility of FOBT in the hospitalized setting. Retrospective chart reviews from the United States (US) (4) and Australia (7) have reported inappropriate use of FOBT among hospitalized patients. No study has examined the practice patterns of FOBT use in hospitalized patients in Canada. No previous study has evaluated the knowledge, beliefs and attitudes of practicing physicians regarding the use of FOBT in hospitalized patients. Moreover, no previous study has evaluated variation in the use of FOBT in hospitals among physicians with different medical specialty training. Determining the group of physicians most likely to use a test in hospitals is important in streamlining the use of the test and providing efficient laboratory services in hospitals. Currently, >8000 FOBTs (with 14% positivity rate; Diagnostic Services Manitoba internal data) are performed annually in the hospitals in Winnipeg Regional Health Authority (WRHA), which prompted the present study.

The aims of the current study were to determine the indications for the use of the FOBT among hospitalized patients; to study physicians' knowledge of the limitations of interpreting guaiac FOBT results in hospitalized patients; and to assess any differences in FOBT use among different groups of practicing physicians.

METHODS

A link to a web-based survey, developed using SurveyMonkey, was distributed by e-mail to all internists (IM) (including general IMs, gastroenterologists [GIs] and other subspecialists), general surgeons (GS), emergency medicine (EM) physicians and family medicine (FM) physicians with admitting privileges practicing in the WRHA. The WRHA is the largest regional health authority in Manitoba and provides health care services to two-thirds of the residents of the province (population 1,271,388), including six hospitals in the city of Winnipeg (population of 723,491) (8). The IM subspecialties included those practicing cardiology, critical care, endocrinology, nephrology, neurology, oncology and rehabilitation medicine. A similar survey was distributed to the clinical members of the Canadian Association of Gastroenterology (CAG). The survey was sent by their respective clinical departments and the CAG National Office. Two reminders were sent four and eight weeks later to improve response rates. The mailing lists and responses remained anonymous to the investigators.

The survey instrument was developed by the authors and pilot-tested by distributing it to 10 other physicians, including GIs, GS and general IM physicians in the WRHA. Modifications were made based on the comments received during pilot testing. The final instrument

included items on demographics of the respondents, their current use of FOBT in hospitals (including indications for use, point-of-care [bedside] use, perceived utility and interpretation of a positive test in the hospital setting) and interest in a newer version of the FOBT (fecal immunochemical test [FIT]), which has better test performance characteristics in the outpatient setting.

For assessing respondents' knowledge of the methodological limitations of guaiac FOBT use in hospitals, respondents were asked two questions. First, they were asked whether the lack of dietary restriction in hospitalized patients would influence the interpretation of the guaiac FOBT ('ordered by yourself or another physician'). Due to the lack of dietary restrictions in hospitalized patients before administration of this test, a false-positive result would be possible. Second, respondents were then asked whether the lack of waiting to allow for development of the guaiac FOBT would influence their interpretation of the FOBT (again 'ordered by yourself or another physician'). In hospitalized patients, often because the FOBT is developed immediately, and plant peroxidases and other interfering substances are not allowed to degrade naturally, the test may produce a false result.

All analyses were performed on anonymized data. Standard descriptive analysis was performed to describe the response frequencies. A priori, it was planned to compare the responses of physicians with different medical specialty training as well as compare responses of the WRHA and CAG respondents (after excluding WRHA GI respondents from the WRHA respondents). Fisher's exact test was used (using R version 3.0.1 [http://cran.stat.sfu.ca/]) to compare categorical variables; a two-sided $P < 0.05$ was considered to be statistically significant. The study was approved by the Research Ethics Board of the University of Manitoba (Winnipeg, Manitoba).

RESULTS

For the WRHA respondents, response rates ranged from 23% among IM to 69% among FM respondents (Table 1). Among the IM respondents, 50% of GI and 65% of general IM physicians completed the survey. Of the WRHA respondents (Table 2), 75% were male, 60% practiced at either or both of the two tertiary centres in the region, and 50% had 10 to 30 years of clinical experience.

For CAG member respondents, the total response rate was 18%, with the highest rate (23%) from members in British Columbia (Table 1). The majority (71%) of CAG member respondents were male (Table 2). Approximately one-half of CAG member respondents practiced in university hospitals and 40% had 10 to 30 years of clinical experience. The majority of hospitals where the CAG respondents practiced had guaiac FOBT available (86%); only 8% of respondents had access to FIT, of which all respondents were from either Quebec or Atlantic Canada. The remaining 6% of respondents were unsure of the type of FOBT available. In the WRHA, a newer version of the guaiac FOBT (Hemoccult II Sensa [Beckman Coulter Inc, USA]) is being used.

TABLE 2
Demographic characteristics of Winnipeg Regional Health Authority (WRHA) and Canadian Association of Gastroenterology (CAG) respondents

Characteristic		WRHA (n=125)		CAG (n=80)
Sex	Male	71	Male	71
	Female	29	Female	29
Primary site of practice	Tertiary centres	61	University hospital(s)	46
	Community hospital	38	Community hospital(s)	52
			Stand-alone clinic(s)	3
Years of clinical experience	<3	10	<3	13
	3–10	28	3–10	43
	10–30	46	10–30	40
	>30	16	>30	5
Population of city of practice	Winnipeg (700,000)	100	<100,000	16
			100,000–1 million	49
			>1 million	34

Data presented as %; percentages may not sum to 100% due to rounding off of percentages in each category of respondents

Table 3 compares survey responses between WRHA (excluding WRHA GI) and CAG member respondents, and Table 4 contrasts survey responses among the different medical specialties within the WRHA. Overall, WRHA respondents were more likely to use the FOBT in hospitalized patients, more likely to believe that the FOBT was useful in assessing emergency room (ER) or hospitalized patients, and less comfortable if use of the FOBT were restricted to laboratory testing ($P<0.05$ for all; Table 2). However, when further stratified, whereas the WRHA GI, general IM and GS had responses similar to CAG respondents (Table 3), the EM and FM respondents were more likely to use the FOBT in hospitalized patients, and most FM respondents did not want the FOBT to be restricted to hospital laboratories (Table 4). When the FOBT was used, the indications for ordering an FOBT were similar among WRHA respondents and CAG members; the most common indications listed were black stools, anemia with iron deficiency and anemia without iron deficiency (Table 3).

WRHA physicians were also more likely to complete the FOBT at the bedside while CAG members preferred sending the test to a laboratory ($P<0.05$; Table 3). Specifically, EM physicians commonly performed bedside testing while general IM, other IM physicians (other than GI) and FM physicians were more likely to send a FOBT to the laboratory ($P<0.001$; Table 4). WRHA respondents were more interested in having FOBT results available within 1 h ($P=0.003$; Table 3). When stratified, EM and FM physicians preferred reporting within 1 h ($P<0.001$; Table 4) while the rest of WRHA respondents would be satisfied if results were reported within 24 h ($P<0.001$).

When asked whether an FOBT altered clinical management of their patients in the past six months, there was no statistically significant difference between WRHA physicians and CAG members (Table 3). However, among WRHA specialties, the majority of EM and FM respondents reported that when an FOBT was performed, it changed their clinical management (Table 4). Interestingly, 29% of WRHA respondents, compared with 43% of CAG members, reported that a colonoscopy was never pursued even if an FOBT was positive in patients who were <50 years of age; this difference was not statistically significant (Table 3).

With regard to the potential limitations of the FOBT use in hospitals, only 28% of WRHA and 36% of CAG respondents believed that the lack of dietary restriction would influence their FOBT result interpretation (Table 3). Among WRHA subspecialties, other IM, FM and EM physicians were less likely to consider that diet may influence the results of the FOBT in hospitals (Table 4). The lack of delayed testing to allow for natural degradation of interfering substances did not influence the interpretation of FOBT results among most of the respondents, with no significant difference between WRHA and CAG respondents or different subspecialties in the WRHA (Table 4).

Finally, although the interest in FIT was similar among CAG and WRHA respondents, WRHA physicians would be more likely to use

the test as a diagnostic tool while CAG members would use it mainly for CRC screening ($P=0.033$; Table 3). Among the WRHA physicians, general IM, GI and GS had responses similar to CAG members with regard to potential use of FIT in hospitals ($P<0.05$ for all; Table 4).

DISCUSSION

To our knowledge, the present survey was the first to examine the knowledge, beliefs and attitudes of different groups of practicing physicians regarding the use of the FOBT in hospitalized patients. Our survey suggests that there is a marked difference among physicians of different medical specialties with regard to use of FOBT for hospitalized patients – namely, significantly higher utilization among EM and FM physicians. There is also higher point-of-care testing among EM physicians who are, therefore, less comfortable with restricting the use of FOBT to hospital laboratories. The most common reported indications for use of FOBT in hospitals in 2013 were evaluation of black stools and anemia with or without iron deficiency.

It is well documented that bedside tests can be of lower quality compared with those performed in the laboratory due to stricter quality control protocols used in laboratories (9,10). The accuracy of bedside use of qualitative tests such as guaiac FOBT may be even less because impaired colour appreciation will impact the interpretation. Reporting of FOBT results within 1 h by the laboratory did not satisfy EM physicians in our study. Hence, we believe it is imperative to study if and how the FOBT is impacting patient management by EM physicians.

Surprisingly, few previous studies have evaluated the indications for ordering FOBT in hospitalized patients. An Australian study (7) examined 461 FOBT samples from 330 patients admitted to three acute care hospitals. These authors reported that the three most common indications for ordering a FOBT were symptoms possibly consistent with gastrointestinal bleeding (57%), anemia (10%), or iron deficiency with or without anemia (8%). A US study completed in 2000 (4) reported that of 421 FOBTs performed on inpatients, 70.5% were performed inappropriately, including on patients with advanced age who were too frail to undergo a colonoscopy and/or possible subsequent surgery or chemotherapy for CRC, patients with active gastrointestinal bleeding in which the management was unchanged, or patients taking acetylsalicylic acid or nonsteroidal anti-inflammatory drugs with no active symptoms. That study, however, did not report the exact indication for why an FOBT was ordered.

We speculate that there may be only two appropriate indications for FOBT use in hospitals. First, there may be an indication for individuals who present to the hospitals with black-coloured stools and concomitant anemia in which the treating physician is unable to differentiate melena from other causes of black stools (eg, from iron supplementation). The second indication would be CRC screening in appropriately selected patients in whom the guaiac FOBT (if that was the version of FOBT used) would not be developed for three days after

TABLE 3
Comparison of survey responses between Winnipeg Regional Health Authority (WRHA) physicians and Canadian Association of Gastroenterology (CAG) member respondents

Question	WRHA physicians* (n=119) [†]	CAG members (n=80) [†]	P
Do not use FOBT in hospitalized patients	44	74	<0.001
Believe FOBT is of value among emergency room patients	58	25	<0.001
Believe FOBT is of value among inpatients	76	26	<0.001
Indication(s) that a respondent would use a FOBT among hospitalized patients			
Black stools	47	23	0.001
Anemia with iron deficiency	47	19	<0.001
Anemia without iron deficiency	40	22	0.013
Undiagnosed gastrointestinal symptoms	28	5	<0.001
Colorectal cancer screening	17	9	0.162
Obtain objective evidence of gastrointestinal bleeding	27	6	<0.001
Do not use FOBT for hospitalized patients	28	58	<0.001
Over the preceding six months, proportion of patients that the result of a FOBT altered clinical management among patients in which a FOBT was ordered by the respondent or by another physician			
0	16	29	0.483
1–25	18	26	0.100
26–50	10	8	0.218
51–75	5	3	0.200
76–100	6	3	0.104
Do not use FOBT among hospitalized patients	12	32	0.037
If FOBT was performed, it was performed at the bedside	55	21	0.006
If FOBT was performed, it was sent to the laboratory	52	92	<0.001
If FOBT was sent to the laboratory, three samples were sent	51	73	0.130
If FOBT was positive, for inpatients <50 years of age, proportion of patients who received a colonoscopy			
0	29	43	0.106
1–25	34	38	0.784
26–50	19	11	0.317
51–75	13	4	0.081
76–100	9	4	0.461
If FOBT was positive, for inpatients >50 years of age, proportion of patients who received a colonoscopy			
0	26	16	0.205
1–25	24	25	1.000
26–50	10	14	0.571
51–75	17	12	0.517
76–100	22	33	0.142
Lack of dietary restrictions WOULD alter interpretation of FOBT	23	36	0.084
Lack of waiting for processing of FOBT WOULD alter its interpretation	19	33	0.057
Comfortable if bedside testing for FOBT were no longer available in favour of STAT laboratory testing	70	81	0.015
Would like FOBT reported			
Within 1 h	28	9	0.003
Within 2 h to 4 h	21	19	0.861
Within 24 h	41	71	<0.001
Would like fecal immunochemical test introduced in hospitals	60	53	0.453
If the fecal immunochemical test was available, indication(s) for ordering it			
Diagnostic aid	39	13	<0.001
Colorectal cancer screening	22	38	0.033
Both diagnostic aid and colorectal cancer screening	19	26	0.347
Would not use it	19	22	0.741

Data presented as % unless otherwise indicated. *Excludes WRHA gastroenterologists; [†]Percentages are based on the number of the individuals responding to the specific item in the survey questionnaire. FOBT Fecal occult blood test; STAT Immediate

stool sample collection. On most occasions, however, melena has distinct characteristics (liquid, shiny and/or foul smelling) accompanied with other signs of upper gastrointestinal blood loss (such as elevated urea/creatinine ratio) and, therefore, should be distinguishable from other causes of black stools. Furthermore, other reasons for the use of FOBT in hospitalized patients may be less appropriate. For example, the use of FOBT to corroborate a patient's history of rectal bleeding may not be

reliable because rectal bleeding can be intermittent. Anemia without iron deficiency with positive FOBT may divert attention from evaluation of a nongastrointestinal source of anemia. Conversely, anemia with iron deficiency merits evaluation of the gastrointestinal tract regardless of FOBT results. Furthermore, FOBT has never been validated for inpatient use or other indications including investigation of anemia or overt bleeding (11).

TABLE 4
Comparison of responses among Winnipeg Regional Health Authority physicians

Question	General IM (n=13)	GI (n=6)	Other IM (n=27)	GS (n=13)	EM (n=40)	FM (n=20)	P
Do not use FOBT in hospitalized patients	85	67	56	77	26	11	<0.001
Believe FOBT is of value among emergency room patients	8	33	68	23	79	61	<0.001
Believe FOBT is of value among inpatients	15	33	88	31	95	94	<0.001
Indication(s) that a respondent would use a FOBT among hospitalized patients							
Black stools	27	33	33	8	87	58	<0.001
Anemia with iron deficiency	9	17	75	42	55	63	<0.001
Anemia without iron deficiency	9	33	54	25	53	53	0.062
Undiagnosed gastrointestinal symptoms	9	17	17	0	50	53	<0.001
Colorectal cancer screening	0	0	42	17	21	16	0.036
Obtain objective evidence of gastrointestinal bleeding	18	0	25	8	53	26	<0.001
Do not use FOBT in hospitalized patients	81	66	42	75	5	0	<0.001
Over the preceding six months, proportion of patients in whom the result of an FOBT altered clinical management among patients for whom an FOBT was ordered by the respondent or by another physician							
0	36	17	26	46	15	25	0.293
1–25	45	0	15	15	36	44	0.066
26–50	0	0	33	8	18	6	0.082
51–75	0	17	11	8	5	6	0.638
76–100	0	17	0	0	13	19	0.040
Do not use FOBT among hospitalized patients	36	50	15	23	8	0	0.008
If FOBT was performed, it was performed at the bedside	40	50	5	0	100	33	<0.001
If FOBT was performed, it was sent to the laboratory	100	50	89	100	6	82	<0.001
If FOBT was sent to the laboratory, three samples were sent	50	0	68	75	13	82	<0.001
If FOBT was positive, for inpatients <50 years of age, proportion of patients who underwent a colonoscopy							
0	45	33	30	63	17	6	0.028
1–25	45	33	11	0	37	20	0.031
26–50	0	17	7	13	10	20	0.573
51–75	0	17	15	25	23	20	0.567
76–100	1	0	37	0	13	33	0.058
If FOBT was positive, for inpatients >50 years of age, proportion of patients who underwent a colonoscopy							
0	18	17	27	63	20	0	0.019
1–25	44	33	8	0	20	19	0.168
26–50	11	0	12	0	10	13	0.990
51–75	11	33	15	13	30	50	0.113
76–100	33	17	38	25	20	19	0.688
Lack of dietary restrictions WOULD alter interpretation of FOBT	46	66	19	33	22	11	0.048
Lack of waiting for processing of FOBT WOULD alter its interpretation	31	33	11	33	23	11	0.391
Comfortable if bedside testing for FOBT were no longer available in favour of STAT laboratory testing	85	83	95	92	32	76	<0.001
Would like FOBT reported:							
Within 1 h	8	33	12	8	65	18	<0.001
Within 2 h to 4 h	8	0	27	8	23	29	0.436
Within 24 h	85	66	62	83	13	53	<0.001
Would like fecal immunochemical test introduced in hospitals	46	83	64	67	40	78	0.227
If the fecal immunochemical test was available, indication(s) for ordering it							
Diagnostic aid	15	0	41	8	57	47	0.004
Colorectal cancer screening	23	66	22	58	10	18	0.005
Both diagnostic aid and colorectal cancer screening	23	33	19	25	10	29	0.208
Would not use it	39	0	19	8	23	6	0.208

Data presented as % unless otherwise indicated, percentages are based on the number of the individuals responding to the specific item in the survey questionnaire. EM Emergency medicine; FM Family medicine; FOBT Fecal occult blood test; GI Gastroenterologists; GS General surgeons; IM Internal medicine; STAT Immediate

Although previous studies have not evaluated differences among physicians with different medical specialty training with regard to FOBT use in hospitals, two US surveys have examined the use of FOBT in outpatients (12,13). Results from these studies (conducted >10 years ago) suggest a significantly larger proportion of physicians were using FOBT for non-CRC screening indications in the US 10 years

ago than found in our survey. For example, Sharma et al (13) reported that of US FM and IM physicians surveyed, 69% and 74% of respondents were using the FOBT for hematemesis and hematochezia, respectively. In the second survey, Sharma et al (12) reported that 51% of US GI respondents would order a FOBT for history compatible with melena before proceeding with a colonoscopy.

Our survey also found that many physicians may not be aware of the need for dietary restriction and/or delayed testing of the collected specimens to limit false results of FOBTs. Previous US surveys showed that approximately 50% of primary care physicians and 22% of GIs did not offer dietary advice before administering an FOBT in the outpatient setting (12,13). A retrospective chart review by Friedman et al (7) reported that only 2% of inpatients had evidence of dietary restrictions before completing an FOBT. Although it has been suggested that most dietary restrictions are not necessary for FOBT use (14), there are limited data regarding the effect of dietary restriction on the results of Hemoccult II Sensa, a newer version of guaiac FOBT with higher sensitivity and lower specificity (15) now in use in Manitoba and elsewhere. We suspect that diet is more likely to affect newer guaiac FOBTs such as Hemoccult II Sensa, which already have lower specificity than the older versions of guaiac FOBTs (15). In addition, there is no controversy surrounding the need to avoid intake of citrus fruits (or vitamin C) before collection of stool specimens to avoid false-negative guaiac FOBTs (16).

In our survey, interest in FIT ranged from 40% to 83%, with approximately one-third of respondents choosing to use this test only for CRC screening in hospitalized patients. Although the use of FIT may alleviate the need for dietary restriction given that the test relies on reaction to the globin component of human hemoglobin, FIT is less likely to be positive when the blood loss is from the upper gastrointestinal tract and, hence, its value to evaluate black-coloured stools remains uncertain.

Our study had several strengths. We examined and compared a wide range of medical disciplines including IM, general surgery, EM and FM. To our knowledge, the present survey was the first to examine knowledge, beliefs and attitudes of various physicians regarding the use of FOBTs in hospitalized patients.

A major limitation of our study was the rather disappointing response rate of 18% among CAG members and 23% among IM physicians. However, these rates are similar to previous response rates found in national surveys: 19.5% among primary care physicians (13) and 24% among GIs (12). Second, similar to other surveys, the study was susceptible to response and recall bias. Respondents who may have a particular interest in CRC screening or possess strong opinions

regarding the use of FOBT in hospitalized patients may have participated in our survey and provided a skewed view of the population as a whole. For example, EM respondents in our survey strongly expressed their need regarding immediate point-of-care testing with the guaiac FOBT. Another theoretical limitation of the survey was overlooking physicians not included on electronic mailing lists or those not accessing their e-mail. Furthermore, a physician's scope of practice (eg, administrative duties, research, retired, etc) was not determined in the survey and may not reflect current clinical practices. Finally, we chose to only assess the views of IM, GS, EM and FM physicians. A large range of other medical specialties may order FOBTs.

Future directions may include a prospective study to assess how often the use of FOBT changes clinical management according to different groups of physicians. EM and FM physicians would be of particular interest because these physicians are more often convinced of the benefit of the FOBT in hospitalized patients, as suggested by our survey. A trial of restricting access to the test could help determine its true impact on clinical care, which could be assessed using before-and-after studies and/or surveys. Continuing medical education efforts should address the potential benefits and limitations of guaiac FOBT use in hospitalized patients as well as the outpatient setting.

CONCLUSION

Results of the present survey suggest that in 2013, FOBTs were being used for indications for which test results may not significantly impact patient management. There are large differences in the use of FOBTs in hospitalized patients among physicians with different medical specialty training.

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