# Original Research

# Patient compliance with screening for fecal occult blood in family practice

Peter E. Hoogewerf,* MB, BS, FCFP, CCFP
T. Gregory Hislop,‡ MD, CM
Brenda J. Morrison,† PhD
Sheilagh D. Burns,* RN
Ronald Sizto,† BSc

**Thirty-two family physicians in British Columbia collaborated in a study to evaluate their patients' compliance when offered testing for fecal occult blood (FOB) with Hemoccult II as a screening test for asymptomatic colorectal cancer. Of the 5003 eligible patients 71% complied. Thirteen variables were investigated. Compliance was found to be directly related to age in a linear manner (chi-squared value for trend = 180.4, $p < 0.0001$), age alone correctly classifying 58.5% of the patients as complying or not complying. The association with other variables was less strong. Restricting the consumption of red meat during the test period had no effect on compliance.**

**Étude en collaboration par 32 médecins de famille de Colombie britannique sur la docilité de leurs clients à pratiquer la recherche, qui leur a été offerte, du sang occulte dans les selles par l'Hemoccult II pour le dépistage des cancers asymptomatiques du côlon et du rectum. Des 5003 sujets, 71% l'ont pratiquée. L'analyse de 13 facteurs montre un rapport linéaire direct de la docilité avec l'âge (khi-carré pour tendance = 180,4; $p < 0,0001$); à partir de l'âge seul on peut prédire la docilité ou la non-docilité de 58,5% des sujets. Le rapport de celles-ci avec les autres facteurs est plus ténu. La diminution de l'ingestion de viande rouge durant la période de l'essai n'a aucun effet sur la docilité.**

*From *the Department of Family Medicine and †the Department of Health Care and Epidemiology, University of British Columbia, and ‡the Division of Epidemiology, Biometry & Occupational Oncology, Cancer Control Agency of British Columbia, Vancouver*

*Reprint requests to: Dr. Peter E. Hoogewerf, 4-2151 McCallum Rd., Abbotsford, BC V2S 3N9*

In Canada, colorectal cancer accounts for 14% of all new diagnoses of cancer, excluding nonmelanotic skin cancer, and 13% of all deaths from cancer.[1] The 5-year relative survival rate for all stages of colorectal cancer remains discouragingly low, at 46%.[2] Until the causes of colorectal cancer are discovered and controlled, the best approach to reducing the morbidity and mortality rates may be through early detection and treatment.[3-7] The Hemoccult II (HOII) test, a modified guaiac test for fecal occult blood (FOB), is currently the subject of several trials.[8-10] However, its impact on reducing the mortality rate of bowel cancer is not clear.[6]

Reported rates of compliance with HOII screening vary substantially, from 9% to 85%, and seem to depend upon the approach to the patient and certain characteristics of the sample population, according to Elliot and Schwarz and their colleagues,[11,12] as well as T.P. Almy and J.G. Brecht (unpublished observations). There is further need to evaluate barriers to compliance when the test is offered to the public. Among the published studies, compliance was lowest when the patients received unsolicited test kits by mail and highest at preventive health care clinics.[13,14] The main objective of our study was to assess patient compliance when HOII is offered by the attending family physician.

## Methods

Family physicians were recruited by a letter sent to all members of the BC chapter of the College of Family Physicians of Canada living in the lower mainland of British Columbia. Between August 1983 and December 1984, 32 (approximately 10%) took part in the study.

All patients attending these practices, no matter what the presenting complaint, were eligible to participate if they were asymptomatic for colorectal

cancer, 45 years of age or older and BC residents. Patients were excluded if they had been tested for FOB in the previous 12 months, had a history of bowel disease, had required FOB testing for nonscreening purposes (e.g., weight loss or change of bowel habit), or had a mental or physical condition preventing their participation. The completeness of patient enrolment in the study was evaluated by checking five randomly selected daysheets per practice over the whole study period.

The following information was solicited from all the enrolled patients: age, sex, marital status, occupation, ethnic origin, mother tongue, length of time under the physician's care and reason for the visit. Also recorded were the location and type of the practice and the number of years the physician had been in practice.

The practices were randomly assigned to one of two dietary groups, defined by whether the patients were allowed to eat red meat during the period of testing. The family physicians were instructed to offer the FOB test to their patients using those techniques of persuasion normal to their everyday practice when suggesting a similar screening procedure — for example, a cervical smear. No special form of approach was mandated, and the physicians were left to follow up the patients according to their usual practice.

The patients were asked to maintain a high-fibre diet and to avoid vitamin C and acetylsalicylic acid throughout the test period. The test kits had instructions printed on the envelope. The patients were requested to take two samples from one stool specimen on three different days and to return the test kit to their physicians.

Compliance was defined as acceptance of the test kit, followed by return of the kit, with a stool sample applied to at least one of the six holes. The test result was considered to be positive if any of the completed holes yielded a positive result.

Three types of analysis were carried out to determine what factors affected compliance: Pearson chi-squared, linear logistic (based on a model of multiplicative effects) and discriminant (based on a model of additive effects). Initial two-dimensional cross-tabulations between compliance and the other variables were constructed and the $\chi^2$ values calculated.

## Results

Of all the age-eligible patients 14% (0 to 43%) were unintentionally omitted from the study, and approximately 15% were ineligible for other reasons: 2% had been tested for FOB in the previous 12 months, 2% had required FOB testing for nonscreening purposes, 6% had a history of bowel disease, and 8% were mentally or physically unsuitable in the physician's opinion; 3% were ineligible for more than one reason.

Of the 5003 patients offered FOB screening, 71% complied; the proportion ranged from 31% to 100% among the practices. Less than 4% of the patients refused to take the test kit from their family physicians. Similar proportions of the two dietary groups complied: 1749 (71.6%) of the 2444 who were not allowed to eat red meat and 1805 (70.5%) of the 2559 without the restriction. Nearly all (98%) applied stool to all six holes of the kit.

Table I presents the most interesting results of the initial statistical analysis. The patient's age, the number of years the physician had been in practice and the length of time the patient had attended the practice were strongly associated with compliance. A test for trend showed that the association with age was linear ($\chi^2 = 180.4$, $p < 0.0001$); the association with the other two variables was not linear. Compliance was not associated with red meat restriction or the patient's sex.

Table II shows how the compliance rate varied with the combination of the patient's age and the

**Table I — Rate of patient compliance with family physician's request for screening for fecal occult blood, by levels of selected variables**

| Variable | No. (and %) of patients | | $\chi^2$ (and p) |
|---|---|---|---|
| | Complying | Not complying | |
| Patient's age, yr | | | |
| < 55 | 865 (59.2) | 596 (40.8) | 180.4 |
| 55–64 | 1081 (70.4) | 454 (29.6) | (< 0.0001) |
| ≥ 65 | 1608 (80.1) | 399 (19.9) | |
| Time physician in practice, yr | | | |
| < 10 | 1209 (73.0) | 446 (27.0) | 37.7 |
| 10–19 | 821 (76.6) | 251 (23.4) | (< 0.0001) |
| ≥ 20 | 1524 (67.0) | 752 (33.0) | |
| Time patient attending practice* | | | |
| < 1 mo | 271 (65.9) | 140 (34.1) | 11.6 |
| 1 mo–5 yr | 1505 (73.3) | 548 (26.7) | (0.003) |
| ≥ 5 yr | 1777 (70.0) | 761 (30.0) | |
| Patient restricted from eating red meat during test period | | | |
| No | 1805 (70.5) | 754 (29.5) | 0.6 |
| Yes | 1749 (71.6) | 695 (28.4) | (0.44) |
| Patient's sex | | | |
| Male | 1491 (70.3) | 629 (29.7) | 0.8 |
| Female | 2063 (71.6) | 820 (28.4) | (0.36) |

*One value was missing.

**Table II — Rate of compliance as a function of the combination of the patient's age and the number of years the physician had been in practice**

| Time physician in practice, yr | Rate of compliance, % | | | |
|---|---|---|---|---|
| | Patient's age, yr | | | |
| | < 55 | 55–64 | ≥ 65 | Overall |
| < 10 | 65.5 | 72.2 | 80.9 | 73.0 |
| 10–19 | 60.9 | 77.4 | 84.6 | 76.6 |
| ≥ 20 | 53.1 | 65.7 | 77.4 | 67.0 |
| Overall | 59.2 | 70.4 | 80.1 | |

number of years the physician had been in practice. Physicians who had been in practice for more than 10 but less than 20 years obtained the highest response rate; those in practice longer were the least persuasive. All were more effective with older patients.

We detected no bias when examining the physicians' practice location (urban, small town or rural), the only variable identified earlier as differentiating volunteer physicians from all general practitioners in British Columbia.[15]

Since the apparent association of these variables with compliance could have been caused by confounding with other variables, we carried out multiple logistic regression analyses in an attempt to separate out the independent effects. The predictor variables considered were those that had shown significant $\chi^2$ values in the cross-tabulations or were suspected of affecting compliance. Terms were included for combinations of variables when it was thought that an interaction might exist. Using an inclusion criterion of significant improvement in fit at the 5% level, we incorporated into the analysis the following independent variables: the patient's age and marital status, the number of years the physician had been in practice, the length of time the patient had attended the practice, the interaction between the last two variables, and the reason for the visit (check-up, emergency or other). Table III shows the $\beta$ coefficients and p values for these variables.

**Table III — Independent variables identified by multiple logistic regression analysis**

| Variable | $\beta$ | $\beta$/standard error | p |
|---|---|---|---|
| Patient's age, yr | | | |
| < 55 (ref. value) | | | |
| 55–64 (1) | 0.456 | 5.62 | < 0.0001 |
| ≥ 65 (2) | 0.958 | 10.13 | |
| Patient's marital status | | | |
| Married (ref. value) | | | |
| Other (1) | 0.236 | 2.04 | 0.0400 |
| Time physician in practice, yr | | | |
| < 10 (ref. value) | | | |
| 10–19 (1) | −0.343 | −1.13 | < 0.0001 |
| ≥ 20 (2) | −0.429 | −1.76 | |
| Time patient attending practice | | | |
| < 1 mo (ref. value) | | | |
| 1 mo–5 yr (1) | 0.235 | 1.41 | 0.0009 |
| ≥ 5 yr (2) | 0.363 | 2.02 | |
| Interaction of last two variables | | | |
| 1 | 0.158 | 0.48 | 0.0040 |
| 2 | 0.457 | 1.34 | |
| 3 | 0.219 | 0.81 | |
| 4 | −0.183 | −0.68 | |
| Reason for visit | | | |
| Check-up (ref. value) | | | |
| Emergency (1) | −0.534 | −1.83 | 0.0040 |
| Other (2) | −0.299 | −3.18 | |

Discriminant analysis identified the same independent variables plus the type of practice (solo or other), the dietary group, and the interaction between the patient's age and the number of years the physician had been in practice; all these variables properly classified 61.6% of the patients as complying or not complying. Age alone correctly classified 58.5%, and adding dietary group to the equation improved the classification by only 0.5%.

## Discussion

Our study demonstrated a high overall rate of compliance (71%) among the 5003 eligible patients offered FOB screening by their family physicians. The patients were unselected, "walk-in" patients attending their family physicians for primary care of any sort. No attempt was made to advertise the study locally, and no selection bias was expected other than that due to the unintentional omission of 14% of the eligible patients, which was detected by scrutiny of the practice daysheets.

Our patients' compliance rate was similar to the rates in other studies in North America (70% to 80%)[7,13,16–19] and South Africa (67%)[11] using strategies that directly involved physicians or nurse practitioners. Approaches by mail, at veterans' social meetings and by outpatient department clerks have had inferior results.[14,19,20] For example, in a British study of two general practices an approach by letter plus HOII achieved a compliance rate of 36%, whereas a letter alone resulted in a rate of only 10%; reminder letters improved the compliance rates to 44% and 37% respectively.[21] In another large study involving general practice in Britain 37% of those offered HOII testing completed the test; the compliance rate was improved through education either by letter or by interview before the test was offered.[22] In two US trials that demonstrated somewhat higher rates (approximately 75%) the patients were self-selected.[7,13] The rate among our patients attending for a complete physical examination (80%) was almost identical to that reported from an Alberta study of similar patients (81%).[23]

In our study the patient's age was clearly the most important variable affecting compliance. The relationship was linear and direct, improving with increasing age. For screening, such a relationship is very advantageous because of the strong positive association between age and risk of colorectal cancer. The same relationship was reported from the United States[13] and Australia,[24] but studies in Britain,[6] Germany[12] and the United States[25] have shown a decrease in compliance with advancing age. A separate analysis of the 386 German-speaking participants in our study showed no significant association between age and compliance, although

the rate was slightly lower for those 65 years of age or older than for those less than 65, as in Schwarz[12] and colleagues' group.

A Danish study[26] showed that compliance decreased significantly with age in women but not in men; the Australian study[24] showed the converse. In our study population the patient's sex was not related to compliance.

Restricting the patient's consumption of red meat had no effect on compliance in our study group. Although the same observation has been made among volunteer subjects,[13,27] we expected an effect when FOB testing was offered to all eligible patients in family practices. However, we cannot be certain how well the patients complied with the dietary restriction. The rates of FOB positivity in the two groups were very similar, 21.7/1000 for the group with the restriction and 20.5/1000 for the group without. Such a similarity has been reported by others.[28] Over 80% of those with FOB positivity in our group without dietary restriction were retested after they had restricted their consumption of red meat: only 30% had positive results this time. An explanation might be a high false-negative rate with second testing or a high false-positive rate with first testing.[28]

The effect of the other variables on patient compliance — for example, the lower compliance of the patients of older physicians and of patients who had been under their physicians' care for a long time — was much smaller and difficult to interpret.

In conclusion, the compliance rates among the eligible patients in our study were satisfactory, and this suggests that FOB screening need not be confined to patients coming in for complete checkups. Should FOB screening for colorectal cancer be demonstrated to be effective in reducing the disease's morbidity and mortality,[29] family physicians would be effective in promoting patient cooperation.

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