ORIGINAL PAPER

Changes in the choice of colorectal cancer screening tests in primary care settings from 7,845 prospectively collected surveys

**Martin C. S. Wong · George K. John · Hoyee W. Hirai ·
Thomas Y. T. Lam · Arthur K. C. Luk · Jessica Y. L. Ching ·
Simon S. M. Ng · Francis K. L. Chan · Sian M. Griffiths ·
Joseph J. Y. Sung**

Abstract

Purpose Colorectal cancer (CRC) is one of the leading causes of cancer mortality worldwide. This study examined factors influencing the choice of participants between colonoscopy and fecal immunochemical test (FIT) in a screening program and the impact of an unbiased educational session on influencing this decision.

Methods Data from 7,845 participants who underwent screening between May 2008 and April 2011 was analyzed. Binary logistic regression and multinomial regression were performed to calculate the odds of selection of colonoscopy instead of FIT and the impact of the educational session on final participant choice, respectively.

Results Of the 7,845 participants, 4,796 (61 %) underwent FIT and 3,049 (39 %) underwent colonoscopy. A significant number of participants changed their initial choice after the educational session, with 27.1 % changing to FIT from colonoscopy and 8 % changing from FIT to colonoscopy. Age, educational level, occupation, income, family history of CRC, perception of risk of CRC, and perceptions regarding CRC screening were significantly different among the groups choosing FIT and colonoscopy. Family history of CRC and high self-perception of CRC risk resulted in higher odds of choosing colonoscopy, whereas older age, single marital status, and negative perception of CRC screening resulted in lower odds. Perceptions of overall health status, occupation, low income, younger age, and negative perceptions of CRC screening were associated with higher odds of change in screening choice.

Conclusions Those at higher odds of changing CRC screening options should be supported with more detailed explanations by primary care physicians to secure a more informed and considered choice.

Keywords Colorectal cancer screening · Test modality · Choice change · Primary care

M. C. S. Wong (✉) · S. M. Griffiths
School of Public Health & Primary Care, Faculty of Medicine, ChineseUniversity of Hong Kong, 4/F, School of Public Health and Primary Care, Prince of Wales Hospital, Shatin, NT, Hong Kong SAR, China
e-mail: wong_martin@cuhk.edu.hk

G. K. John
Department of Public Health, University of Oxford, Rosemary Rue Building, Old Road Campus, Headington, Oxford OX3 7LF, UK

H. W. Hirai · T. Y. T. Lam · A. K. C. Luk ·
J. Y. L. Ching · S. S. M. Ng · F. K. L. Chan · J. J. Y. Sung
Institute of Digestive Disease, Faculty of Medicine, Chinese University of Hong Kong, 7/F, Clinical Sciences Building, Prince of Wales Hospital, Shatin, NT, Hong Kong SAR, China

Introduction

Colorectal cancer (CRC) is now the third leading cause of cancer in males and second leading cancer in females worldwide. In 2008, there were 1.2 million cases of colorectal cancer in the world [1]. According to the most recent GLOBOCAN data by the International Agency for Research on Cancer, the worldwide age-standardized incidence rate is 17.3 per 100,000 persons per year [1]. Although the incidence of CRC has been declining or stabilizing in many developed countries like the United States, Australia and Canada, the developed nations still accounts for 60 % of the current burden of CRC [1–3]. It is also a major problem in the developed countries of Asia

with China (Hong Kong), Japan, Korea, and Singapore figuring in the top 20 countries with the highest age-standardized CRC mortality rate [3].

CRC is the second commonest cause of cancer in Hong Kong with 4,031 cases reported in 2008 [4]. The incidence rate of CRC in Hong Kong standardized to the world population was 45.8 per 100,000 in men and 30.5 per 100,000 in women in 2008 with incidence rates and associated mortality showing an increasing trend over the last few decades [4]. Screening led to a rapid decline in incidence in the short term, suggesting the urgent need for an effective and coordinated CRC screening strategy to be implemented.

The commonest screening methods are fecal occult blood testing (FOBT) and colonoscopy. A study on the uptake of CRC screening services by the uninsured population in the state of Maryland, United States, over a period of 2 years showed that the maximum uptake among the screening options was for colonoscopy, followed by FOBT, and a combination of the two [5]. This study highlights the importance of the provision of options in CRC screening to increase participation by disadvantaged groups and reducing disparities in screening participation. In a study done in Hong Kong, fecal immunochemical tests (FIT, Hemosure) and colonoscopy were almost equally preferable to participants; with younger age, history of CRC in the family and self-perceived poor health status influencing participants to choose colonoscopy instead of FIT [6]. This may suggest that patients are willing to trade off a level of comfort and convenience for peace of mind of having a screening test done which will provide more accurate results.

The Cancer Expert Working Group (CEWG) on cancer prevention and screening in Hong Kong advised health care providers to discuss the available options with their clients and provide adequate information regarding the limitations, risks, and benefits of each method [7]. This puts the responsibility of a major decision regarding the method of CRC screening in the hands of the client. The Asia Pacific Consensus group also laid down similar guidelines for CRC screening and also gave recommendations on treatment of polyps based on their size [8]. In some countries, for instance the UK, the population at risk is offered only FOBT as the initial method [9] as opposed to all 3 options as in the US [10] and according to the current recommendations of the CEWG in Hong Kong.

The present study evaluated the factors influencing the choice of screening test option in a large population of Hong Kong and to determine the impact of an unbiased educational program on this choice. This study is an update and addendum to a preliminary study on the acceptance of FIT, and colonoscopy done by the center based on the final choice of screening option from a smaller population from this database [6]. We aimed to identify a group of screening participants who are more prone to change their

CRC screening option. In clinical practice, not all screening offers will involve detailed explanations of the screening tests, and most patients would not necessarily been given an opportunity to express both their initial test preference and their final choice after physician explanation. Therefore, screening participants who "change their screening modality" might represent those subjects who alter their decision when more detailed information is available, but which might be too late for them to request revision of their test choice in clinical practice. Those at higher risks for this "decision change," or "regret for not having chosen the most preferred tests," could arguably be less compliant to the screening program over time [11]. These individuals might represent subjects who should be offered more information and time for screening test consideration in clinical practice when compared to those who do not change their screening options. Compliance to tests over time is one of the most crucial components of programmatic performance for population-based CRC screening, where failure to provide screening participants with their preferred tests may contribute to non-compliance and potentially program failure [12].

Methods

Setting

The methodology has been described elsewhere [6]. Briefly, this study was conducted in a community-based center, which provides education and CRC screening to a large population of Hong Kong. A territory-wide invitation for participation in this study was given through the media. The data used are based on recruitment between 1 May 2008 and 16 April 2011. This study was approved by the Clinical Research Ethics Committee of the Chinese University of Hong Kong.

Study design

This study prospectively recruited a consecutive cohort of 7,845 participants aged 50–70 years who self-referred for CRC screening in the center via telephone, fax, email, or walk-in.

Participants and recruitment

The eligibility criteria for this study were the following: (1) age 50–70 years; (2) absence of existing or previous symptoms suggestive of CRC such as haematochezia, malena, anorexia or change in bowel habit in the past 4 weeks, or weight loss greater than 5 kg in the past 6 months; and (3) absence of screening test for CRC

performed in the past 5 years. Exclusion criteria included personal history of CRC, colonic adenoma, diverticular diseases, inflammatory bowel disease, prosthetic heart valve, or vascular graft surgery. Participants with medical conditions, which were contraindications for colonoscopy, were also excluded [6].

Registered participants were invited to visit the center and fill in a two-part self-administered questionnaire. At the outset, participants were asked to choose a preferred method for CRC screening (fecal test vs. colonoscopy). Information on their demographics, socioeconomic status, knowledge on CRC symptoms, risk factors of colorectal cancer, self-perception of risk for CRC, self-perceived overall health status, family history of CRC, and attitudes toward CRC screening methods were also collected.

All participants were then offered an educational session using a standard video followed by a standardized talk by trained instructors. The video included information on the natural history of colorectal cancer, its epidemiology, risk factors, clinical features, importance of regular screening, and detailed procedures of FIT and colonoscopy. The potential risk and benefits of FIT and colonoscopy were also explained. The educational seminars aimed to provide the screening participants more considered and informed choice of the screening modalities. All instructors were trained by a team of gastroenterologists, family physicians, and public health professionals prior to the program. The talks were delivered in a standardized manner with both FIT and colonoscopy being presented in a non-preferential manner. Each session lasted for approximately one and a half hour and was limited to a maximum audience size of 30. Interaction between participants was discouraged.

After the educational session, participants chose a final option of screening (annual, two-specimen FIT for up to 5 years vs. a single direct colonoscopy) as their preferred choice for CRC screening.

This study used Hemosure (El Monte, CA, USA), which obviated the need for dietary restriction before the tests. Both tests and follow-up visits, including colonoscopy appointments for those with positive FIT tests, were offered free-of-charge to the participants.

Variables

The primary outcome was the proportion of participants choosing FIT versus colonoscopy after the educational talks. A four-point Likert scale was used to assess perceptions on the likelihood of complication arising from screening procedures and physical discomfort (strongly agree, agree, disagree, and strongly disagree), while a five-point Likert scale was used to assess self-perception of personal health status (very good, good, fair, poor, and very poor). This survey was developed based on the Health

Belief Model and validated by a panel of epidemiologists, psychologists, and clinicians. We utilized the same questionnaire in assessing the attitudes and perceptions of CRC screening pertinent to the Health Belief Model as in our previous cross-sectional survey [13].

In addition, the impact of the educational sessions on influencing choice of screening method was assessed. The primary outcome for this component was the change in initial choice after the educational session. There were 4 subgroups classified according to the change in initial choice: (1). FIT to Colonoscopy, (2). Colonoscopy to FIT, (3). Unsure to FIT, and (4). Unsure to Colonoscopy.

Statistical methods

The Statistical Package for Social Sciences (SPSS) version 19.0 (Chicago, IL, USA) was used for data entry and analyses. Chi-square test of association was used to test the statistical significance of the association between age, gender, marital status, educational status, occupational status, family history of CRC, monthly household income, and the choice of colonoscopy instead of FIT. One binary logistic regression analysis was used to evaluate the crude and adjusted odds ratios for the final choice of colonoscopy over FIT. To determine the impact of the educational sessions, multinomial logistic regression was used with the change in initial choice being the outcome variable, while age, gender, educational status, occupational status, monthly household income, and the other self-perceived variables were taken as covariates.

Results

A total of 7,845 participants underwent CRC screening. Among them, 4,796 (61 %) took FIT and 3,049 (39 %) underwent colonoscopy. The majority of participants (47 %) chose colonoscopy as their initial choice, which decreased to 39 % as their final choice after the educational session. A significant number of participants (31 %) were uncertain of the initial choice of CRC screening option (Table 1).

The majority of participants belonged to the 50–54 and 55–59 age groups and only 12 % of participants were aged ≥65 years (Table 2). The majority of participants were female (58 %) and married (85 %). There was history of CRC among the first-degree relatives in 970 participants (12 %), and 966 participants (12 %) had history of CRC among their second-degree relatives. The majority of participants (66 %) perceived themselves to be at risk for CRC. Among them, 37 % felt that their overall health status as very good or good (Table 2). The awareness of CRC screening methods among participants was high, with

Table 1 Choice of screening tests

	Number of participants[a]	Percentage[b]
Initial choice		
FIT	1,712	21.8
Colonoscopy	3,719	47.4
Not sure	2,414	30.8
Total	7,845	100.0
Final tests performed		
FIT	4,796	61.1
Colonoscopy	3,049	38.9
Total	7,845	100.0

Conducted in May 2008 and April 2011, Hong Kong

[a] All numbers excluding missing values

[b] Percentage calculated out of total number of participants

59 % and 79 % being aware of FIT and colonoscopy, respectively. An overwhelming majority of participants (83 %) felt that CRC screening was very or quite necessary for people aged ≥ 50 years, while 13 % were uncertain. Turning to questions regarding perception of CRC screening, 45 % felt that CRC screening would lead to complications, 56 % felt it would be uncomfortable, and 40 % felt it would be embarrassing. However, 75 % responded they would surely take up an offer for free CRC screening if offered in the coming year.

Regarding the association between demographic factors and the final choice of CRC screening method, age ($p < 0.001$), educational level ($p < 0.001$), marital status (0.007), occupational status ($p < 0.001$), monthly Household income ($p = 0.031$), and family history of CRC ($p < 0.001$) were significantly different among the groups choosing FIT and colonoscopy. Self-perceived factors such as the perception of risk for CRC ($p < 0.001$), the perception of necessity for CRC screening ($p < 0.001$), complications ($p = 0.033$), discomfort ($p < 0.001$), and embarrassment ($p < 0.001$) were also significantly different.

One binary logistic regression model was constructed with the final choice of colonoscopy as the outcome. After adjustment of all potential covariates, older age, single marital status, perception of CRC screening as unnecessary, uncomfortable, or embarrassing were factors associated with lower odds of choosing colonoscopy over FIT. Participants perceiving themselves as having higher risk for CRC and those with family history of CRC had higher odds of choosing colonoscopy.

Of the total participants given the option of choosing the final screening method, 92 % who chose FIT initially remained their original choice unchanged after the session. Of the participants who initially chose colonoscopy, a significant proportion (27 %) changed to FIT as their final choice for CRC screening. Four multinomial logistic

Table 2 Participant characteristics

	No. of participants[a]	Percentage[b]
Age (years)		
50–54	2,519	32.1
55–59	2,566	32.7
60–64	1,778	22.7
65–70	973	12.4
Gender		
Male	3,301	42.1
Female	4,536	57.8
Screening test as final choice		
FIT	4,796	61.1
Colonoscopy	3,049	38.9
Educational level		
Primary or below	2,303	29.4
Secondary	4,359	55.6
Tertiary or above	1,156	14.8
Marital status		
Married	6,629	84.5
Single/divorced/widowed/others	1,203	15.3
Occupational status		
Full time	2,696	34.4
Part time or retired	2,654	33.8
Housewife and others	2,485	31.7
Monthly household income ($US)		
<1,285$	5,026	64.0
1,285$–2,571$	1,182	15.1
2,571$–3,856$	381	4.9
3,856$–5,141$	157	2.0
>5,142$	224	2.9
Refused to answer	858	10.9
Self-perceived overall health status		
Very good or good	2,867	36.6
Fair	4,552	58.1
Poor or very poor	415	5.2
Self-perceived risk of CRC		
At risk	5,191	66.2
Not at risk	2,113	26.9
Not sure	515	6.6
Family history of CRC		
Nil	4,572	58.3
First-degree relatives	970	12.4
Second-degree relatives	966	12.3
Others	1,335	17.0
Aware of fecal tests for CRC screening		
Yes	4,659	59.4
No	2,968	37.8
Not sure	211	2.7

Table 2 continued

	No. of participants[a]	Percentage[b]
Aware of colonoscopy for CRC screening		
Yes	6,187	78.9
No	1,560	19.9
Not sure	88	1.1
Aware of sigmoidoscopy for CRC screening		
Yes	542	6.9
No	6,617	84.3
Not sure	669	8.5
Necessity of CRC screening for people aged ≥ 50		
Very or quite necessary	6,509	83.0
Not very necessary or unnecessary	277	3.5
Not sure	1,048	13.4
Screening will lead to complications		
Strongly agree or agree	3,535	45.1
Strongly disagree or disagree	4,287	54.6
Screening will be uncomfortable		
Strongly agree or agree	4,411	56.2
Strongly disagree or disagree	3,411	43.5
Screening will be embarrassing		
Strongly agree or agree	3,172	40.4
Strongly disagree or disagree	4,656	59.3
If CRC is offered free will you go for screening in the coming year?		
For sure	5,843	74.5
Likely to	1,719	21.9
Unlikely to	202	2.6
No	67	0.9

Conducted in May 2008 and April 2011, Hong Kong

[a] All numbers excluding missing values

[b] Percentage calculated out of total number of participants

regression analyses were used to calculate the odds ratios of switching from an initial choice to a different option after the educational session, for the four outcomes "FIT to colonoscopy," "colonoscopy to FIT," "unsure to FIT," and "unsure to colonoscopy," respectively. Participants who perceived their health as being very good or good had lower odds of changing from FIT to colonoscopy ($p = 0.047$). Considering the change from an initial choice of colonoscopy to FIT, full-time employment, income, and self-perception of risk were significant factors (Table 3).

Among participants uncertain about an initial choice, those aged 50–54 years had 47 % higher odds of choosing FIT as the final screening method than the oldest group ($p = 0.037$). Participants who felt CRC screening would lead to complications had 30 % lower odds of choosing FIT compared to those who felt CRC screening would not lead to complications ($p = 0.002$). Regarding the choice of colonoscopy after being unsure initially, participants aged 50–54 years had a 70 % higher odds of choosing colonoscopy compared to the oldest age group ($p = 0.025$). Younger age groups are more likely to change their screening option following a neutral educational session. Employment and self-perception of risk for CRC were also important in this group with participants working either full time or part time having higher odds of choosing colonoscopy (60 % higher and 42 % higher, respectively) compared to those not working ($p = 0.014$ and $p = 0.045$, respectively). Participants who perceived themselves at risk of CRC had 55 % higher odds of choosing colonoscopy after expressing uncertain screening choice ($p = 0.003$).

Discussion

This study is an extension of our previous evaluation on the acceptance of FIT and colonoscopy based on the final choice of screening option from a smaller sample size of this consecutive cohort of self-referred CRC screening participants [6]. A larger sample from the same database was used, and the impact of the educational session in influencing the final decision by the participant was also examined. In comparison with the previous study, differences in education, marital status, and monthly household income have emerged as additional significant factors between the colonoscopy and FIT groups. Poor self-perceived health status, which is a significant factor for choosing colonoscopy reported in the smaller study [6], does not attain statistical significance.

Previous research evaluating participant preferences between colonoscopy and fecal tests have identified significant differences in ethnicity, education, family history of CRC and colonic polyps and previous history of sigmoidoscopy between groups choosing colonoscopy over fecal tests [14]. In a study done in low- and middle-income populations in the United States, the main reason for choosing colonoscopy was accuracy and for fecal tests was ease and convenience [14]. Accuracy has been identified as the most important determinant influencing the choice of screening test for CRC [15, 16]. Participants for whom discomfort was a major issue preferred fecal tests to invasive ones, whereas those with a prior history of colonoscopy preferred invasive tests [16]. In a study conducted among Chinese Americans, physician recommendation was the most important factor determining choice of screening method between fecal test, sigmoidoscopy and colonoscopy, while acculturation and self-perceived risk of developing CRC were not significant factors determining choice of method [17].

Table 3 Impact of the educational session on change of initial choice to colonoscopy

	FIT to colonoscopy				Colonoscopy to FIT			
	AOR	95 % CI		p value	AOR	95 % CI		p value
Age (in years)								
50–54	0.500	0.206	1.217	0.127	1.175	0.774	1.783	0.450
55–59	0.845	0.395	1.804	0.663	1.090	0.738	1.609	0.664
60–64	0.445	0.186	1.068	0.070	1.069	0.721	1.587	0.739
65–70	1.000	Reference			1.000	Reference		
Gender								
Male	0.969	0.515	1.824	0.922	0.979	0.736	1.302	0.884
Female	1.000	Reference			1.000	Reference		
Educational level								
Primary or below	1.495	0.599	3.729	0.388	0.519	0.870	0.569	1.329
Secondary	1.078	0.465	2.498	0.861	0.445	1.159	0.794	1.694
Tertiary or above	1.000	Reference			1.000	Reference		
Marital status								
Married	2.107	0.864	5.136	0.101	1.044	0.758	1.438	0.793
Single/divorced/widowed/others	1.000	Reference			1.000	Reference		
Occupational status								
Full time	1.971	0.906	4.291	0.087	**1.639**	**1.156**	**2.324**	**0.005**
Part time or retired	1.053	0.498	2.227	0.893	1.118	0.808	1.548	0.500
Housewife and others	1.000	Reference			1.000	Reference		
Monthly household income ($US)								
<1,285$	0.607	0.201	1.826	0.374	0.641	0.377	1.090	0.101
1,285$–2,571$	0.466	0.159	1.364	0.164	**0.557**	**0.333**	**0.930**	**0.025**
2,571$–3,856$	0.359	0.107	1.208	0.98	**0.526**	**0.303**	**0.911**	**0.022**
3,856$–5,141$	1.186	0.374	3.760	0.772	0.541	0.286	1.022	0.058
>5,142$	1.000	Reference			1.000	Reference		
Self-perceived overall health status								
Very good or good	**0.381**	**0.147**	**0.986**	**0.047**	1.264	0.692	2.309	0.445
Fair	0.442	0.182	1.074	0.071	1.357	0.754	2.443	0.309
Poor or very poor	1.000	Reference			1.000	Reference		
Self-perceived risk of CRC								
At risk	1.697	0.902	3.192	0.101	**1.364**	**1.058**	**1.758**	**0.017**
Not at risk	1.000	Reference			1.000	Reference		
Family history of CRC								
Absent	0.901	0.423	1.922	0.788	0.823	0.593	1.140	0.241
First-degree relatives	1.607	0.631	4.093	0.320	1.386	0.898	2.139	0.140
Second-degree relatives	1.000	Reference			1.000	Reference		
Necessity of CRC screening for people aged ≥50 years								
Very or quite necessary	0.968	0.286	3.279	0.959	1.176	0.656	2.108	0.587
Not sure	0.631	0.143	2.795	0.545	1.261	0.656	2.423	0.486
Not very necessary or unnecessary	1.000	Reference			1.000	Reference		
Screening will lead to complications								
Strongly agree or agree	0.697	0.390	1.245	0.223	0.831	0.641	1.078	0.163
Strongly disagree or disagree	1.000	Reference			1.000	Reference		
Screening will be uncomfortable								
Strongly agree or agree	1.406	0.724	2.730	0.315	0.915	0.695	1.205	0.527
Strongly disagree or disagree	1.000	Reference			1.000	Reference		
Screening will be embarrassing								

Table 3 continued

	FIT to colonoscopy				Colonoscopy to FIT			
	AOR	95 % CI		*p* value	AOR	95 % CI		*p* value
Strongly agree or agree	1.630	0.913	2.909	0.098	0.859	0.664	1.110	0.244
Strongly disagree or disagree	1.000	Reference			1.000	Reference		

Conducted in May 2008 and April 2011, Hong Kong

AOR adjusted odds ratio

The bold values represent *p* < 0.05

Several important factors influencing the utilization of CRC screening services by the Chinese population of Hong Kong have been identified in this study. The higher odds of choosing colonoscopy in participants with first- and second-degree relatives with CRC highlight the possibility that these subjects might be more concerned about screening test accuracy and early detection of pre-malignant lesions. Arguably, early screening in individuals with a family history of CRC leads to a better yield in terms of mortality reduction. Furthermore in this study, a higher self-perception of CRC risk led to 42 % higher odds of choosing colonoscopy. In contrast, participants who felt CRC screening was not necessary for population aged 50 and above had 36 % lower odds of choosing colonoscopy. Health education programs for the public should therefore be strengthened and emphasize on the importance of CRC screening among those without any risk factors for people aged 50 years or older. Moreover, the higher risk and vulnerable groups like the elderly population in Hong Kong, who showed 32 % lower odds of choosing colonoscopy, might be attributed to their perception that colonoscopy is too invasive to receive. This implies that more educational initiatives should be focussed on the relative safety of colonoscopy as a screening modality with low complication rates during counseling with potential screening participants.

Perceptions of discomfort and embarrassment have emerged as important factors leading to less people choosing colonoscopy. This suggests that there is a need for physicians to explain the procedure in details to clarify any uncertainties and reduce anxiety in participants accessing CRC screening services.

A significant proportion of participants changed their initial choice after the educational session in this study. This number was low in the group which chose FIT initially (8 %) compared to the group which chose colonoscopy (27 %). Participants who perceived their health to be very good or good had 62 % lower odds of changing from FIT to colonoscopy. This may suggest that people who feel healthier perceive themselves to be at a lower risk for developing CRC and hence prefer less invasive tests for screening. Full-time employment, low income, and perceived risk for developing CRC led to higher odds of changing from colonoscopy to

FIT. This may be explained by the effect of the educational session, which provided the participants with a detailed explanation of the time commitment and pros and cons of the procedures in the study. The high costs of colonoscopy outside the study setting (around HK $8,000) may be a factor influencing initial choice in the low-income groups in the study. The influence of perception in change of initial choice again highlights the importance for health care professionals to start detailed discussions regarding screening early on during routine visits, so that patients are not rushed into making a decision based solely on the physician's recommendation. Personal involvement in decision-making regarding screening has been shown to increase compliance and should be an integral part of programs whenever possible. Self-perception of a higher risk for CRC was again a major factor, which led undecided participants to choose colonoscopy as the final choice. Thus, self-perception of risk for CRC emerged as a factor both in participants choosing colonoscopy over FIT as a final choice and also in determining the influence of health education in changing initial choices made before the educational session.

This study on population choice of method for CRC screening is important for several reasons. It is one of the few studies on CRC screening with a large sample size conducted in the Chinese population, which has been shown to have higher self-perceived risks for CRC as compared with the general public. This lends good statistical validity and generalizability to the results. However, several limitations should be mentioned. Firstly, it is a cross-sectional survey that examined associations instead of causation. It is proposed to study compliance in the FIT group longitudinally, and the results from which will play a major role in validating population preferences. Secondly, this study provided free services for CRC screening, which did not resemble most actual settings. Future studies should include user fees for both screening choices to determine real population preferences of screening method. Lastly, this screening program used open invitations in the media for recruitment, which could result in a healthy volunteer effect and hence possible selection bias. Future trials could be randomized, as invitations could be sent according to the area of residence or workplace.

Several patient characteristics such as age, gender, education, occupation, marital status, and ethnicity have been shown to be important determinants of compliance to FOBT. Providing choice of screening method to participants and educational sessions on CRC has been shown to increase the population intention to participate in CRC screening [18]. Such measures should be incorporated in future CRC screening programs targeted to the patient groups, which changed their screening options as identified in this study.

References

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM (2010). GLOBOCAN 2008, cancer incidence and mortality worldwide: IARC CancerBase No. 10 [Internet]. International Agency for Research on Cancer, Lyon, France
2. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D (2011) Global cancer statistics. CA Cancer J Clin 61:69
3. Center MM, Jemal A, Smith RA, Ward E (2009) Worldwide variations in colorectal cancer. CA Cancer J Clin 59:366–378
4. Hong Kong Cancer Registry HA (2008) Hong Kong Cancer Registry. Fast stats for colorectal cancer, 2008
5. Sarfaty M, Feng S (2006) Choice of screening modality in a colorectal cancer education and screening program for the uninsured. J Cancer Educ 21:43–49
6. Wong MC, Tsoi KK, Ng SS, Lou VW, Choi SY, Ling KW, Chan FK, Griffiths SM, Sung JJ (2010) A comparison of the acceptance of immunochemical faecal occult blood test and colonoscopy in colorectal cancer screening: a prospective study among Chinese. Aliment Pharmacol Ther 32:74–82
7. Cancer Expert Working Group (2010) Recommendations on colorectal cancer screening. Cancer Expert Working Group on Cancer Prevention and Screening, Hong Kong 2010
8. Sung JJ, Lau JY, Young GP, Sano Y, Chiu HM, Byeon JS, Yeoh KG, Goh KL, Sollano J, Rerknimitr R, Matsuda T, Wu KC, Ng S, Leung SY, Makharia G, Chong VH, Ho KY, Brooks D, Lieberman DA, Chan FK, Asia Pacific Working Group on Colorectal Cancer (2008) Asia Pacific consensus recommendations for colorectal cancer screening. Gut 57:1166–1176
9. National Health Services UK (2011) NHS bowel cancer screening programme website
10. USPSTF (2008) Screening for colorectal cancer: summary of recommendations. Services AfHRaQUSDoHH
11. Levin TR (2012) The importance of choosing colorectal cancer screening tests: comment on "Adherence to colorectal cancer screening". Arch Intern Med 172:582–583
12. Inadomi JM, Vijan S, Janz NK, Fagerlin A, Thomas JP, Lin YV, Muñoz R, Lau C, Somsouk M, El-Nachef N, Hayward RA (2012). Adherence to colorectal cancer screening: a randomized clinical trial of competing strategies. Arch Intern Med 172:ioi120005575-582
13. Sung JJ, Choi SY, Chan FK, Ching JY, Lau JT, Griffiths S (2008) Obstacles to colorectal cancer screening in Chinese: a study based on the health belief model. Am J Gastroenterol 103:974–981
14. DeBourcy A, Lichtenberger S, Felton S, Butterfield K, Ahnen D, Denberg T (2008) Community-based preferences for stool cards versus colonoscopy in colorectal cancer screening. J Gen Intern Med 23:169–174
15. Schroy Iii P, Glick J, Robinson P, Heeren T (2007) Screening preferences of patients at familial risk of colorectal cancer. Dig Dis Sci 52:2788–2795
16. Janz NK, Lakhani I, Vijan S, Hawley ST, Chung LK, Katz SJ (2007) Determinants of colorectal cancer screening use, attempts, and non-use. Prev Med 44:452–458
17. Teng EJ, Friedman LC, Green CE (2006) Determinants of colorectal cancer screening behavior among Chinese Americans. Psycho-Oncology 15:374–381
18. Hart AR, Barone TL, Mayberry JF (1997) Increasing compliance with colorectal cancer screening: the development of effective health education. Health Educ Res 12:171–180