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Preferences for CT colonography and colonoscopy as diagnostic tests for colorectal cancer: A discrete choice experiment

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Abstract

Objective—Computed tomography colonography (CTC) is an alternative diagnostic test to colonoscopy for colorectal cancer and polyps. The aim was to determine test characteristics important to patients and to examine trade-offs in attributes that patients are willing to accept in the context of diagnosis of colorectal cancer.

Methods—A discrete choice study to assess preferences of patients with clinical indications suspicious of colorectal cancer who experienced both CTC and colonoscopy as part of a diagnostic accuracy study in South Australia. Results were analysed using a mixed logit model and presented as odds ratios (OR) for preferring CTC over colonoscopy

Results—Colonoscopy was preferred over CTC as the need for a second procedure after CTC increased (odds ratio of preferring CTC to colonoscopy=0.013), as the likelihood of missing cancers or polyps increased (OR of CTC: colonoscopy=0.62) and as CTC test cost increased (OR of CTC: colonoscopy=0.65–0.80). CTC would be preferred to colonoscopy if a minimal bowel preparation was available (OR=1.7). Some patients were prepared to trade-off the diagnostic and therapeutic advantage of colonoscopy for a CTC study with a less intensive bowel preparation. Preferences also varied significantly with sociodemographic characteristics.

Conclusions—Despite CTC often being perceived as a preferred test, this may not always be the case. Informed decision making for diagnostic tests for colorectal cancer should include discussion of the benefits, downsides and uncertainties associated with alternative tests, as patients are willing and able to make trade-offs between what they perceive as the advantages and disadvantages of these diagnostic tests.

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Keywords

discrete choice experiments; patient preference; colorectal cancer; colonoscopy; CT colonography

Introduction

Computed tomography colonography (CTC), also known as virtual colonoscopy, has been advocated as a possible alternative diagnostic test to colonoscopy for colorectal cancer and polyps, on the basis that it is less invasive and therefore more acceptable to patients. However there remain a number of important differences between CTC and colonoscopy [1]. Although diagnostic accuracy studies generally favour colonoscopy [2–4] patients who have lesions found at CTC will subsequently be advised to have conventional colonoscopy. Conversely patients with no lesions at CTC will usually avoid a colonoscopy. The procedures also vary in patient discomfort, use of sedation, rates of complications and, for CTC, the identification of extra-colonic findings that may require investigation and treatment. At present, bowel preparation is similar for CTC and colonoscopy but potential developments in faecal tagging or faecal subtraction techniques may eventually permit less intensive regimens in patients having CTC [5]. Finally, the two procedures use different health system resources and there may be differences in costs to insurance providers or to patients. These differences suggest that patients deciding between CTC and colonoscopy as diagnostic tests will need to make trade-offs between the perceived advantages and disadvantages of each test, and patient preferences should therefore be an important determinant of test choice [6,7].

Comparisons of patient experiences with both procedures are highly variable and range from less discomfort and difficulty with CTC to similar experiences with both procedures to less discomfort with colonoscopy [8–17]. Patients consistently report concerns over the inconvenience and discomfort associated with bowel preparations [10–15,18,19]

A number of studies have examined consumer preferences for CT colonography and colonoscopy (as well as tests such as faecal occult blood tests) as screening tests for colorectal cancer (for example [20–22]). Our study however, specifically considers patient preferences for CT colonography and colonoscopy as diagnostic tests, that is, in patients with clinical indications suggestive of colorectal cancer (CRC). It is unclear whether existing evidence on consumer preferences generated in the context of colorectal cancer screening is applicable to the context of clinical diagnosis. Given differences in respondent populations (patients with clinical indications suggesting CR cancer, rather than asymptomatic, well, general population respondents), there are likely to be differences in the relative importance of attributes and in the benefit: harm trade-offs that are acceptable to patients in the diagnostic, compared to screening contexts.

In this study of patient preferences for diagnostic tests for colorectal cancer, we have used a discrete choice experiment (DCE) to 1) identify the extent to which attributes of a test such as test accuracy or type of bowel preparation affected test preference; 2) determine the relative importance of these attributes; and 3) explore the extent to which patients are willing to make trade-offs between perceived advantages and disadvantages of the tests in choosing their preferred diagnostic test for colorectal cancer.

METHODS

We assessed patient preferences for CTC and colonoscopy in 130 patients who had recently undergone both tests as part of a diagnostic accuracy study [23]. Participants had indications appropriate for diagnostic colonoscopy, including bowel symptoms, positive faecal occult blood tests, or a family history of colorectal cancer.

Discrete Choice Experiments

Patient preferences were assessed using a discrete choice experiment (DCE) [24–26]. The method is based on the idea that goods and services, including health care services can be described in terms of a number of separate attributes or factors. For example, a diagnostic test may be described in terms of the false negative rate, the false positive rate, costs, or other factors, such as whether it can be performed in an inpatient or outpatient setting. The levels of attributes are varied systematically in a series of questions and respondents choose the option that they prefer for each question. People are assumed to choose the option that is most preferred, or has the highest ‘value’. From these choices, a mathematical function is estimated which describes numerically the value that respondents attach to different choice options. Other data collected in the survey, including attitudinal questions and sociodemographic information, may also enter the value functions as explanatory variables. Ultimately, DCE studies can determine which attributes are driving patient preferences, the trade-offs between attributes that people are willing to accept, and how changes in attributes can lead to changes in preferences and likely service uptake. Recent publications outline considerations for design and analysis of such studies, and these suggested methods have been followed here [24–26].

Identifying the attributes

A systematic review of the literature of patient experiences and preferences of CTC and colonoscopy, and face to face interviews with 14 patients who had experienced both CTC and conventional colonoscopy were used to identify attributes. Ten candidate attributes were identified: out-of-pocket cost, test accuracy (missing cancers or polyps), ability to perform therapeutic procedures, need for a second test/procedure versus only having one procedure, having a general anaesthetic, ability to leave hospital by yourself, type of bowel preparation, level of discomfort, exposure to radiation, and time required to perform the test. It is not feasible to include every attribute that is important to every respondent, but attributes should include the most salient attributes for the majority and factors of relevance to the policy context [24,26]. As the number of attributes increases, so does task complexity and respondent burden; therefore the number of attributes included should be balanced against these issues [24,26]. The 14 patients plus eight doctors (radiologists, gastroenterologists and surgeons) ranked these attributes in terms of importance and we calculated the mean rank for each attributefor doctors and for patients. The ordering of importance was comparable between patients and doctors. Using this ranking, and focussing on attributes where the levels were different between the two tests, we used the four most highly ranked attributes in the DCE: likelihood of needing a second therapeutic procedure after CTC to treat polyps or cancer, the type of bowel preparation (intensive or minimal), the test accuracy (specifically the false negative rate or likelihood of missing a small cancer or a polyp), and out-of-pocket cost (Table 1).

Calculation of attribute levels

Attribute levels for ‘likelihood of needing a second procedure after CTC to treat polyps or cancer’ and ‘chance of missing cancers or polyps’ were presented as absolute frequencies [27–29]. Levels for the attribute of ‘likelihood of needing a second procedure’ were based upon the test positivity rates from the clinical literature for CTC [30–37] that ranged from approximately 20% – 40%. Assuming all positive CTC studies are followed by a colonoscopy, 20% to 40% of those undergoing a CTC would require a colonoscopy for possible therapeutic intervention. The levels and description for the bowel preparation attribute were based on patient information on bowel preparations used at the hospital where patients underwent the diagnostic tests; minimal bowel preparation was presented as having only minimal diarrhoea. Test accuracy was presented as the absolute number of people who have cancers or polyps missed, as a proportion of all those that undergo the tests. It was calculated based upon the test positivity rates of 20–40% [30–37] and the false negative rate for colonoscopy and CTC [38–42]. The levels of the out-of-pocket cost attribute were based upon the fact that, at the time of the study, colonoscopy was fully funded by Medicare Australia. CT colonography however, was not subsidised, and therefore was associated with an out-of-pocket cost of up to $300 (telephone survey of private radiology providers).

Design of the DCE

The DCE consisted of three attributes with two levels and one attribute with four levels for CTC and a fixed colonoscopy option (1 level for each attribute). For each DCE question, the attribute levels were varied for the CTC option (Table 1) and remained fixed for colonoscopy, representing the status quo at the time. A full factorial design with 32 choice sets was developed (D-error of 0.001). In each question, patients chose between two labelled alternatives: CT colonography or colonoscopy; a 'choose neither test' option was not included because tests were being evaluated in patients requiring some diagnostic investigation for colorectal cancer. As patients had experienced both tests as part of the diagnostic accuracy study, and were familiar with the name and characteristics of both tests, we used a labelled design.

Pilot study

We conducted a pilot study of the DCE in ten people who had experienced both CT colonography and colonoscopy as part of a pilot for the diagnostic accuracy trial [23]. Results indicated that respondents were able to understand attribute descriptions and levels and complete the 32 discrete choice questions without undue burden.

Study format & sample

The DCE was mailed to 154 consecutive patients approximately 4 weeks after they had a CTC and same-day colonoscopy as part of the diagnostic accuracy study [23]. Participants could complete the questionnaire themselves or be interviewed by telephone by a research nurse. Those who chose to be interviewed by telephone were asked to refer to the paper copy of the questionnaire at the time of the interview. The interview schedule included a description of the attributes, a practice discrete choice exercise to familiarise respondents with the format and interpretation of the attributes followed by discrete choice questions and sociodemographic questions. Respondents nominated their preferred test for each of the 32 hypothetical questions (see Table 2 for example question). The study was approved by the University of Sydney Human Research Ethics Committee, and the Northwestern Adelaide Health Service Ethics of Human Research Committee, and individual informed consent was obtained from all respondents.

Analysis

We used a mixed logit (ML) model to analyse patient preferences. A mixed logit model is a logistic regression model where different regression parameters (β's) are estimated for each respondent, thereby better capturing the true decision making profile of respondents. In DCE, the respondent is assumed to choose the alternative in each question that leads to the higher level of value. The value function has an outcome (dependent) variable and explanatory variables. The outcome variable is the choice between two or more alternatives made by respondents for each question, while explanatory variables are the attributes used to describe the tests, or other observed characteristics of respondents such as demographics.

Additional discussion of the mixed logit approach and DCEs more generally is available elsewhere [24,26,43,44].

Interactions between attributes, and between attributes and patient characteristics (age, gender, perceived risk, income, family history of colorectal cancer, education, previous experience of colonoscopy, previous diagnosis of cancer or polyps, current test outcome) were also explored before estimating the final choice model. Only the interaction between test cost and the respondent's income was significant. Two income groups were therefore created – income group 1 had an income of up to A$30,000 per year, while income group 2 had an income over A$30,000 per year. Given the age of respondents, a cut-off of A$30,000 per year is approximately equivalent to the median gross household income of people aged over 65 [48]. The cost attribute was therefore segmented into one attribute for people with annual income less than A$30,000 per year and another for people with higher incomes. *A priori*, it would be expected that the cost of the test would be less important to people with a higher income (group 2).

Models were evaluated for goodness of fit using the likelihood ratio Chi-square statistic for the global test of zero model coefficients, the McFadden's pseudo R-squared, and Akaike's information criterion (AIC). All model parameters were initially specified as random. To achieve the most parsimonious model possible, without compromising model fit, each variable that was non-significant as a random parameter was progressively changed to a fixed parameter, and the model re-estimated. Model fit parameters, and Log Likelihood, were assessed after each re-specification, and non-random parameters that were non-significant were dropped if their removal did not significantly compromise model fit. Model results are expressed as parameter estimates (β), the odds of preferring CTC to colonoscopy (and 95% confidence intervals of the odds ratios) and p-values. Benefit: harm trade-offs were calculated and categorical variables were effects coded. All analyses were conducted using NLOGIT Version 4.01.

Interpretation of the DCE

A positive β coefficient indicates that as the level of that attribute increases, CTC is preferred over colonoscopy (more likely to be chosen); a negative β coefficient indicates that as the level of the attribute increases, CTC is less likely to be chosen (colonoscopy is the preferred test). Odds ratios (OR) for the likelihood of preferring CTC over colonoscopy, given changes in attribute levels, were also calculated. An OR of greater than 1 indicates that CTC was preferred to colonoscopy while an OR of less than 1 indicates that colonoscopy was preferred over CTC (CTC was less preferred).

RESULTS

The DCE was completed by 130 of the 154 patients who were mailed the questionnaire (response rate of 84.4%). Of these, 35% (46/130) were interviewer-assisted and 65% were self-completed. They were analysed as one group as there were no significant differences in the characteristics of interviewer-assisted or self-completed respondents or in preference models between groups (data not shown). The practice discrete choice exercise completed by all respondents indicated that respondents understood and correctly interpreted the attributes, their levels and the DCE question. Demographic characteristics of respondents are presented in Table 3.

Discrete choice preferences

All 130 respondents were included in the discrete choice analyses. Table 4 shows the results of the final preference model. Test preference was significantly influenced by all test attributes and by some sociodemographic characteristics. The 130 respondents were presented with a total of 4160 pair-wise choice sets; there were missing data for 28 choice sets. Conventional colonoscopy was chosen in 79% of all choice sets. This apparent preference for colonoscopy is also borne out in the choice model data which indicates most attributes suggested a preference for colonoscopy over CT colonography.

Influence of test characteristics

Colonoscopy was preferred over CTC (i.e. CTC was less preferred than colonoscopy) as the need for a second procedure (colonoscopy) after CTC increased; as the likelihood of having cancers and polyps missed by CTC increased; and as the cost of CTC increased. For every 10% increase in the risk of needing a second procedure after CTC (i.e. 100 from 1000 people tested), the likelihood of patients preferring CTC instead of colonoscopy was significantly reduced (OR = 0.013). Similarly, for every 1% increase in the risk of having a cancer or polyp missed (i.e. 10 from 1000 people tested have a cancer or a polyp missed), the likelihood of preferring CTC over colonoscopy was also significantly reduced (OR = 0.62). Cost of CTC was also a significant driver of preference for colonoscopy, particularly for respondents with lower incomes: for every A$10 increase in the out of pocket cost associated with CTC, the likelihood of choosing CTC over colonoscopy was significantly lower. The effect of income was stronger for people with lower incomes (OR = 0.65) than for people with higher incomes (OR = 0.80). In contrast, the only attribute that led to CTC being preferred over colonoscopy was the type of bowel preparation; with a minimal rather than an intensive bowel preparation, respondents were almost twice as likely to prefer CTC to colonoscopy (OR = 1.72).

Influence of sociodemographic factors

Respondents who knew someone with colorectal cancer (OR = 0.23), or perceived their own risk of colorectal cancer to be higher than average (OR = 0.19) were significantly less likely to prefer CTC to colonoscopy. Increasing age was also a significant predictor of lower preference for CTC, with an OR of 0.39 for a 10 year increase in age. In contrast, those respondents who had previous experience of colonoscopy (prior to the trial) were significantly more likely to prefer CTC (OR = 8.2), while those who had completed high school education or above were also more likely to prefer CTC (OR = 3.4). Family history of colorectal cancer and having private health insurance did not significantly influence test preference.

Are people willing to trade-off benefits and harms?

We also calculated the benefit: harm trade-offs that patients were willing to accept. To avoid an intensive bowel preparation, respondents were willing to accept, on average, the test missing small cancers or polyps in an additional 16.6 out of 1000 people tested (95% CI: 14.9 –18.3), and were willing to accept, on average, an additional 82.3 out of 1000 people having to undergo a second procedure following CTC to treat polyps or cancers (95%CI: 67.3 97.3). For a 1% reduction in the risk of missing a small cancer or polyp, people were willing to accept, on average, an additional 132.7 out of 1000 needing a second procedure after CTC (95%CI: 81.4–184.1).

DISCUSSION

In this study, we use a DCE to assess patient preferences for diagnostic CT colonography and colonoscopy as diagnostic tests for colorectal cancer. Our results suggest that colonoscopy is the preferred diagnostic test for most people, and that patient preferences related not only to the characteristics of the tests, but were also associated with sociodemographic characteristics such as age, perceived risk of colorectal cancer, knowledge of people who have colorectal cancer, previous experience of colonoscopy and income.

Our results indicate that patients would prefer a test with a lower chance of needing a second procedure, a minimal instead of intensive bowel preparation, a lower chance of missing cancers or polyps and a lower out-of-pocket cost.

In relation to need for a second procedure, an increase in the likelihood of needing colonoscopy after CTC was associated with a substantial decrease in the odds of preferring CTC. This indicates that respondents valued the fact that colonoscopy could complete the diagnostic and therapeutic components in one procedure. It is also consistent with qualitative studies [45] showing that patients perceived a second diagnostic procedure as not only inconvenient, but as responsible for delaying diagnosis and treatment. Despite this, however, some people were willing to accept an increase in the number of people needing a second procedure if it meant there a lower chance of missing a cancer or polyp.

Bowel preparation significantly influenced test preference; respondents were almost twice as likely to choose CTC over colonoscopy if there was an option of minimal bowel preparation. This is consistent with other studies indicating bowel preparation is the most inconvenient aspect of the tests [18,19,45]. Indeed, some patients were willing to accept increases in the number of people needing a second procedure or a reduction in diagnostic accuracy for a less intensive bowel preparation.

Patient preferences were also significantly influenced by test accuracy (the likelihood of missing small cancers or polyps). There is often an underlying assumption by patients that a newer test is a more accurate test [45]. Our study, and others [45], however, have shown that even small changes in test accuracy can significantly influence diagnostic test preference. Patients were willing to accept an increase in the number of people undergoing a second procedure to lower the risk of missing cancers or polyps.

Sociodemographic factors were also generally consistent with *a priori* expectations. Respondents with a higher income were less concerned with test cost, compared to those on a lower income. Furthermore, people who knew someone with colorectal cancer and perceived their own risk of colorectal cancer to be higher than average were more likely to prefer colonoscopy. In contrast, those who had experienced a previous colonoscopy were less likely to want to repeat that experience and showed a stronger preference for CTC.

The literature reports significant heterogeneity of preferences for diagnostic CTC and colonoscopy, some favouring CTC, [10–15,17] and others favouring colonoscopy [8, 9, 19, 45, 46]. This variability indicates that individual preferences are important, and should be one of the primary considerations in deciding the most appropriate diagnostic test for a given patient. It also suggests that different patients are willing to accept different levels of trade-offs between what they perceive as the advantages and disadvantages of the tests, and therefore a “one test fits all” approach is unlikely to be appropriate. To facilitate informed patient decision making, we therefore need to not only understand what attributes influence test preference, and their relative importance to patients, but also the extent to which patients are likely to accept trade-offs between attributes, such that the most relevant information can be provided to patients.

Overall this study provides a better understanding of the decision making process of patients – it goes beyond simply asking which test is preferred and provides insights into why one test might be preferred over another and the benefit: risk trade-offs patients are willing to make in choosing a diagnostic test. Test preferences can change, depending on the amount and type of information, and the method of presentation [45]. There is a danger in assuming that that the ‘newest’ test, or the ‘least invasive’ test will be the most preferred by patients [45]. Our study demonstrates that is not always the case, with the majority of patients preferring colonoscopy to CT colonography when provided with explicit information about potential benefits, downsides and uncertainties of both tests. While the results of this study should not be seen as replacing a discussion of an individual patient’s preference, it may help clinicians target the type of information that is most relevant for patients and thereby support informed decision making in the context of a clinical encounter. Much has been written about the importance of informed decision making and shared decision making in the context of screening decisions [47–52]. Similar consideration should be given to the provision of information for patients making decisions about which diagnostic test to undertake. Our study indicates that patients are willing and able to incorporate somewhat complex numerical information regarding potential benefits, downsides and uncertainties of diagnostic tests, and therefore should be given the opportunity to do so in the context of a clinical consultation where alternative diagnostic tests are being considered. If we do not provide patients with comprehensive information of the potential benefits, downsides and uncertainties associated with diagnostic tests, and we fail to appreciate the trade-offs that patients are willing to accept between them, we run the risk of assuming patients will prefer the newest and ‘least invasive’ test [45], and thus risk providing care that is not aligned with true patient preferences.

Whilst there have been a number of studies examining stated preferences for CTC as a screening test, to our knowledge, this is the first study to elicit preferences for CTC or colonoscopy as diagnostic tests using a DCE. This distinction between screening and diagnosis is important as the clinical context in which a decision is being made is likely to influence the value attached to various attributes, and the benefit: harm trade-offs that are acceptable to patients. Our analysis uses best practice modelling methods and estimates the trade-offs people are willing to make between the perceived advantages and disadvantages of the diagnostic tests.

A number of limitations, however, should be borne in mind. Firstly, our analysis is limited to the preferences of patients who had experienced both tests as diagnostic tests. This has the advantage that respondents have a better understanding of the actual tests but preferences of these patients may not be the same as those of patients who have not experienced CTC or colonoscopy. This study also specifically considers preferences for CTC and colonoscopy as diagnostic tests. In the context of a screening decision, there are likely to be differences in the importance of attributes and in particular, differences in the trade-offs that people are willing to accept; these have been considered by other authors, for example [20–22,53]. Our attributes were based upon qualitative and quantitative data from our specific patient group. In different respondent populations, however, other attributes, such as complication rates, or exposure to radiation with CTC may also influence preferences, despite the fact these factors did not seem to be particularly important to our patients. In calculating attribute levels, we have assumed that all patients with lesions on CTC will be advised to have colonoscopy. This issue continues to be debated as some physicians recommend colonoscopy only for patients with lesions >5 mm or even ≥10 mm in diameter. Finally, our analysis was restricted to the preferences of patients at one, albeit large, hospital in Australia. Preferences may vary across countries and health systems, and might also be influenced by local factors such as available levels of sedation available with colonoscopy, or even staff characteristics [54].

Despite CT colonography often being perceived as a test that patients will prefer over colonoscopy, this study suggests that this is not always the case. Informed decision making for diagnostic tests for colorectal cancer should therefore include discussion of the benefits, downsides and uncertainties associated with alternative tests, as patients are willing and able to make trade-offs between what they perceive as the advantages and disadvantages of these diagnostic tests. Clearly, DCE results are not a direct substitute for establishing individual preferences in the context of a clinical consultation, however our data may help inform a discussion of diagnostic testing options with patients and in turn facilitate an informed test choice.

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Table 1

Attributes and levels for CT colonography and colonoscopy

Description	CT colonography	Colonoscopy (fixed)
How likely it is that you will need a second procedure after CTC to treat polyps or cancer	200 in 1000 people	None – one procedure to diagnose and treat polyps
	400 in 1000 people	
Bowel preparation	Intensive	Intensive
	Minimal	
Test accuracy (likelihood of missing small cancers or polyps)	20 from 1000 people tested	10 from 1000 people tested
	40 from 1000 people tested	
The one–off cost to you personally	$0 (no cost)	$0 (no cost)
	$100	
	$200	
	$300	

Table 2

Example of choice question

Example Scenario	CT colonography	Conventional colonoscopy
How likely it is that you will need a second procedure after CTC to treat polyps or cancer	200 in 1000 people	None – one procedure to diagnose and treat polyps
Bowel preparation	Minimal	Intensive
Test accuracy (likelihood of missing small cancers or polyps)	40 from 1000 people tested	10 from 1000 people tested
The one – off cost to you personally	$100	$0 (no cost)

(please tick one box)

Which test would you choose?	**Choose CT colonography** ☐	**Choose conventional colonoscopy** ☐

Table 3

Characteristics of respondents (n=130)

Characteristics	**N (n=130)**	**(%)**
Mean age *(Range, SD)*	62 *(27–84, 13)*	
Gender (M:F)	61:69	47:53
Education		
Did not complete high school	78	60
Completed high school / TAFE/technical/trade	38	29
Degree (university or college)	14	11
Employment		
Full-time	24	19
Part-time/casual	21	16
Home duties	12	9
Retired/pension	67	51
Not working	6	5
Private Health Insurance	18	14
History of polyps/adenoma	24	18
History of CRC	17	13
Family history of any cancer	71	55
Family history of CRC	27	21
Know someone with CRC	69	53
Self perceived risk of colorectal cancer		
A lot/lower than average	52	40
Average	47	36
A lot/higher than average	26	20
Previous experience of conventional colonoscopy (before trial entry)	58	45
Household Income (p.a.) (n=113)		
< $20,000	66	58
$20,000 – $30,000	22	19
$30,001 – $50,000	12	11
> $50,000	13	12
Mean post procedure pain/discomfort rating for CTC (0=none, 5= a great deal) (SD)	1.94 (1.01)	
Mean post-procedure pain/discomfort rating for colonoscopy (SD)	1.63 (0.87)	

Table 4

Results from the final choice model, model coefficients and odds of choosing CTC (compared to colonoscopy)

Variables		β–coefficient	P value	Odds Ratio* (95% CI)
Random parameters				
The likelihood of needing a second procedure after CTC to treat polyps or cancer (for every 100 extra people requiring a second procedure)	Mean	−4.34255	<0.00001	0.0130 (0.0046 – 0.5989)
	SD	3.22389	<0.00001	
Minimal bowel preparation (compared to intensive)	Mean	0.544266	0.0001	1.7233 (1.3015 – 2.2820)
	SD	0.707303	<0.00001	
Chance of missing small cancers (per extra 10 people with cancers or polyps missed by CTC)	Mean	−0.485578	0.0030	0.6153 (0.4716 – 0.8778)
	SD	0.748421	<0.00001	
Out of pocket cost (income < A$30,000) (for every $10 increase in cost)	Mean	−0.427942	<0.00001	0.6518 (0.5916 – 0.9536)
	SD	0.427942	<0.00001	
Out of pocket cost (income > A$30,000) (for every $10 increase in cost)	Mean	−0.217278	<0.00001	0.8047 (0.7610 – 0.9730)
	SD	0.217278	<0.00001	
Age (for every 10 year increase in age of respondents)	Mean	−0.939513	<0.00001	0.3908 (0.2685 – 0.8320)
	SD	0.38832	<0.00001	
Higher than average self perceived risk of colorectal cancer (vs. average/ less than average risk)	Mean	−1.68232	0.0129	0.1859 (0.0494 –0.7002)
	SD	1.4102	0.0951	
Know someone with colorectal cancer (yes vs. no)	Mean	−1.45683	0.0064	0.2330 (0.0818 – 0.6637)
	SD	0.827497	0.2179	
Had a previous conventional colonoscopy (yes vs. no)	Mean	2.10882	0.0002	8.2385 (2.7231 –24.9247)
	SD	3.90094	<0.00001	
Non–random parameters				
Constant	Mean	7.26075	<0.00001	
Has private health insurance (yes vs. no)	Mean	−0.80222	0.2065	0.4483 (0.1291 –1.5564)
Family history of colorectal cancer (yes vs. no)	Mean	0.449515	0.3064	1.5676 (0.6624 – 3.7098)
Education level (completed high school or above vs. did not complete high school)	Mean	1.23091	<0.00001	3.4243 (2.1812 – 5.3759)
McFadden's R^2 (Pseudo R^2)†		0.822		
AIC		0.263		
Log Likelihood		−475.27		

*Odds of choosing CT colonography compared to colonoscopy per specified unit change in attribute

†The ML model is statistically significant in predicting patient preferences with a pseudo –R2 of 0.82 (χ2= 4387 (with 20 df and a p–value <0.00001).