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Preferences for CT Colonography and Colonoscopy as Diagnostic Tests for Colorectal Cancer: A Discrete Choice Experiment

Kirsten Howard, MAppSc, MPH, MHlthEcon, PhD[1,], Glenn Salkeld, G Dip Health Economics, MPH, PhD[1], Michael Pignone, MD, MPH[2], Peter Hewett, MBBS, FRACS[3], Peter Cheung, BN[4], Julie Olsen, BN[5], Wayne Clapton, P/G Dip in Info Proc'g, MACS, BMBS, MPH, FAFPHM(RACP), MBA[6], Ian C. Roberts-Thomson, MBBS, FRACP[4]*

[1]*Sydney School of Public Health, University of Sydney, Sydney, Australia;* [2]*Department of Medicine, University of North Carolina-Chapel Hill, NC, USA;* [3]*Department of Surgery, University of Adelaide, Adelaide, South Australia, Australia;* [4]*Department of Gastroenterology and Hepatology, The Queen Elizabeth Hospital, Woodville South, South Australia, Australia;* [5]*Department of Radiology, Royal Adelaide Hospital, Adelaide, South Australia, Australia;* [6]*Policy and Intergovernment Relations Division, SA Health, Government of South Australia, Adelaide, South Australia, Australia*

A B S T R A C T

Objective: Computed tomography colonography (CTC) is an alternative diagnostic test to colonoscopy for colorectal cancer and polyps. The aim of this study 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 the diagnosis of colorectal cancer. **Methods:** A discrete choice study was used 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 analyzed by using a mixed logit model and presented as odds ratios (ORs) for preferring CTC over colonoscopy. **Results:** Colonoscopy was preferred over CTC as the need for a second procedure after CTC increased (OR of preferring CTC to colonoscopy = 0.013), as the likelihood of missing cancers or polyps increased (OR of preferring CTC to colonoscopy = 0.62), and as CTC test cost increased (OR of preferring CTC to 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's 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.

Keywords: colonoscopy, colorectal cancer, CT colonography, discrete choice experiments, patient preference.

Introduction

Computed tomography colonography (CTC), also known as virtual colonoscopy, has been advocated as a possible alternative diagnostic test to colonoscopy for colorectal cancer (CRC) 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]. Diagnostic accuracy studies generally favor colonoscopy [2–4]. Patients who have lesions found at CTC will subsequently be advised to have conventional colonoscopy. However, 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 extracolonic findings that may require investigation and treatment. At present, bowel preparation is similar for both CTC and colonoscopy, but potential developments in fecal tagging or fecal 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 CTC and colonoscopy (as well as tests such as fecal occult blood tests) as screening tests for CRC [20–22]. Our study, however, specifically considers patient preferences for CTC and colonoscopy as diagnostic tests, that is, in patients with clinical indications sug-

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* *Address correspondence to:* Kirsten Howard, Sydney School of Public Health, Edward Ford Building (A27), University of Sydney, Sydney, NSW 2006, Australia.

E-mail: kirsten.howard@sydney.edu.au.

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gestive of CRC. It is unclear whether existing evidence on consumer preferences generated in the context of CRC screening is applicable to the context of clinical diagnosis. Given differences in respondent populations (patients with clinical indications suggesting CRC, 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 with screening contexts.

In this study of patient preferences for diagnostic tests for CRC, we have used a discrete choice experiment (DCE) to 1) identify the extent to which the 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 the perceived advantages and disadvantages of the tests in choosing their preferred diagnostic test for CRC.

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 fecal occult blood test results, or a family history of CRC.

Discrete choice experiments

Patient preferences were assessed by using a 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 that 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 for CTC and colonoscopy and face-to-face interviews with 14 patients who had experienced both CTC and 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 anesthetic, 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 factors that are the most salient for the majority and the most relevant to policymaking [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 attribute for doctors and for patients. The ordering of importance was comparable between patients and doctors. By using this ranking, and focusing on attributes for which 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 the likelihood of missing a small cancer or a polyp), and out-of-pocket cost (Table 1).

Calculation of attribute levels

Attribute levels for the "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]. Attribute levels for the "likelihood of needing a second procedure" were based on the test positivity rates from the clinical literature for CTC [30–37], which ranged from approximately 20% to 40%. Assuming that 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 diarrhea. Test accuracy was presented as the absolute number of people who have cancers or polyps missed as a proportion of all those who undergo the tests. It was calculated on the basis of the test positivity rates of 20% to 40% [30–37] and the false-negative rates for colonoscopy and CTC [38–42]. The levels of the out-of-pocket cost attribute were based on the fact that at the time of the study,

Table 1 – Attributes and levels for CTC and colonoscopy.

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

CTC, computed tomography colonography.