The Effect of High Quality Assurance Measures in Bowel Cancer Screening on Patient Satisfaction of Colonoscopy

Sanchoy Sarkar1,3, Varinder Athwal2, Richard P. Sturgess2, Daniel Lythgoe4, Keith Bodger2,3

1) Department of Gastroenterology and Hepatology, Royal Liverpool University Hospital; 2) Digestive Diseases Centre, University Hospital Aintree; 3) Institute of Translational Medicine, University of Liverpool; 4) CRUK Liverpool Cancer Trials Unit, University of Liverpool, Liverpool, UK

Abstract

Background: To ensure patient safety, rigorous quality assurance (QA) measures for colonoscopy were introduced for the Bowel Cancer Screening Programme (BCSP) in England. The impact of these high QA measures on patient experience and satisfaction is unknown. Aims: To determine the impact of this high-level QA of colonoscopy on patient satisfaction. Methods: A case controlled study using a retrospective audit & telephone interview patient survey was performed between 1/1/07-01/10/08 on patients that underwent colonoscopy. Data were analyzed by comparing quantitative and qualitative performance colonoscopy indicators in patients within the BCSP with those outside the programme (NON-BCSP). Participants: 720 patients that had undergone day case colonoscopy. Setting: Accredited BCSP centre: University Hospitals Aintree, UK. Intervention: Comparing patient satisfaction between BCSP to NON-BCSP populations. Results: Uptake was 68% (n=488). Caecal intubation rate (CIR) was higher (99 v 91%; p=0.001), and sedation doses lower in BCSP compared to NON-BCSP (Midazolam dose Median [IQR] (1 [0, 2] v 2 [1, 3] mg; respectively p=0.0001). For patient satisfaction and experience, scores were high and pain scores were low in both groups; with no statistically significant difference between groups. However, willingness to have a repeat procedure was higher in BCSP (p=0.001). Conclusions: Whilst superior CIR with less sedation within BCSP, overall scores were similar for patient satisfaction, both in and outside the programme. With the higher ‘willingness for repeat’ within BCSP, a positive impact of higher level of QA is suggested and that good patient experience can be achieved with minimal conscious sedation in expert hands.

Key words

Colonoscopy – bowel cancer screening programme – patient satisfaction – accreditation – quality assurance – patient experience,

Abbreviations

BCSP: Bowel cancer screening programme; GI: Gastrointestinal; NHS: National Health Service; ASA: American Society of Anaesthesiologists; ITT: Intention to Treat; NON-BCSP: None bowel cancer screening; CIR: caecal intubation rate; OLR: Ordinal logistic regression; QA: Quality assurance

Introduction

Following the disappointment of a national UK colonoscopy audit in 2004 [1], significant measures for quality assurance (QA) in colonoscopy were implemented for the introduction of the Bowel Cancer Screening Programme (BCSP) in England including a national endoscopy quality-standards service framework and accreditation system (Global Rating Scale) [2]. Consequently, units wanting to offer national BCSP, would not only have to be accredited but achieve the highest standards within this framework. Furthermore, it was mandated that colonoscopy within the programme could only be performed by a BCSP accredited colonoscopist for whom there were three requirements: 1) audit data to support high QA standards for nomination; 2) passing a central competency exam, and 3) central monitoring of a colonoscopist’s performance on a number of mandated QA standards.

BCSP in England was introduced in 2006 targeting a moderate risk population. Whilst this programme is provided by the NHS, it is not only separate in funding, but also, in the method of service delivery from the usual NHS primary and secondary health care systems. It is based upon biennial guaiac Faecal Occult Blood Test (gFOBT) and if positive, patients are invited urgently for colonoscopy following a 45 minute counselling session in a specialist nurse practitioner led clinic. In addition, all procedures are observed, timed
and centrally reported by an independent BCSP nurse practitioner.

Emerging data shows colonoscopy within the BCSP is achieving exceptionally high QA standards. However, to date, the impact of this accreditation process on patient satisfaction remains unqualified. The aim of this study was to determine the impact of this higher level of QA upon patient satisfaction. To test the hypothesis that patients within BCSP should have higher levels of patient satisfaction, we compared patient satisfaction both within and outside the BCSP. To assess patient satisfaction we used a number of individual criteria, namely: patient experience, patient expectation, pain during the procedure, overall patient comfort and willingness to have a repeat procedure.

**Methods**

**Study design**

This study was performed as a colonoscopy service evaluation audit within a nationally accredited screening unit. A case controlled study was designed using a retrospective audit colonoscopic and patient demographic data, and patient telephone survey comparing both patient outcomes and their experience inside BCSP to those outside the programme (NON-BCSP).

The study was presented to Sefton and Liverpool Ethics committee who declared it as exempt on the basis that it fitted the criteria for a service evaluation and customer care audit, provided verbal consent was ascertained and documented from each patient prior to study inclusion.

Inclusions were patients (aged 18 or above) that underwent a day-case colonoscopy at University Hospitals Aintree (Accredited BCSP centre since 2006, Liverpool, UK) between 01/07/07 and 01/10/08. Patients were divided into two sub-groups; those within the BCSP who had their colonoscopy performed by accredited colonoscopists [BCSP] (n=5) and those outside the programme who had their procedure performed by non-accredited colonoscopists [NON-BCSP] (n=17). The latter group comprised consultants (n=8) and trainees (n=9) performing colonoscopy either with full in-room or distant supervision.

A standard proforma (containing patient’s contact details and an interview questionnaires see Table I) for 720 patients from the colonoscopy database were randomly assigned by a third party to monthly telephone interview clinics 30 days (maximum of up to 7 days after this) following their procedure which was performed by 6 interviewers who were blinded to the procedure findings (except procedure date). Following informed verbal consent, a telephone interview was conducted. The data from the proformas were entered into the same access database as the patient demographics and colonoscopy findings.

**Colonoscopy and outcomes**

Colonoscopies were performed using Olympus variable stiffness colonoscopes with air insufflation, with access to a scope guide or paediatric colonoscope. Patients received the same bowel preparation and the use of sedation and antispasmodics (Buscopan - hyoscine bromide) was left to patient and operator choice.

Details of patient’s age, gender, American Society of Anaesthesiologists’ (ASA) grade, sedation, adenoma detection (after verification on histology database), procedure time, post procedure co-morbidity, complication and mortality were recorded using a combination of the endoscopy database, hospital IT system and the patient interview.

**Patient satisfaction and interviews**

Interviews were performed by either gastroenterology specialist nurse practitioner or gastroenterology medical staff and were independent of the colonoscopists that had performed the procedures. All were issued standard scripts

<table>
<thead>
<tr>
<th>Question</th>
<th>Purpose of question</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How did you find the actual procedure? ’Expectation’</td>
<td>To get insight into how the procedure met with their expectations</td>
</tr>
<tr>
<td>2</td>
<td>How would you rate your overall experience? ’Experience’</td>
<td>To ascertain how patients would rate the whole patient journey-experience which of course included the procedure itself.</td>
</tr>
<tr>
<td>3</td>
<td>How would you rate your discomfort during the procedure? ’Pain’</td>
<td>To ascertain the degree of discomfort the patient felt during the procedure</td>
</tr>
<tr>
<td>4</td>
<td>Would you have the procedure again? ’Repeatability’</td>
<td>To check how patients felt about repeatability given their experience of the procedure.</td>
</tr>
<tr>
<td>5</td>
<td>How comfortable did you feel throughout the procedure? ’Comfort’</td>
<td>A quality indicator to measure how comfortable patients felt about their procedure &amp; to help validate their discomfort scores to check agreement between these questions for validation purposes</td>
</tr>
</tbody>
</table>
and questionnaires in order to standardize the patient interviews.

As there are no formally validated systems, modified versions of questionnaires used for telephone interview to ascertain endoscopy feedback in previous studies [15] and modified version of pain/discomfort section of the EQ-5D questionnaire [16] were used. Patients were asked 5 questions pertaining to their expectation, overall experience, pain during the procedure, willingness for repeatability and their comfort on an ordinal scale with verbal descriptors as a guide (Table I).

Other questions within the questionnaire related to post complications including bleeding, perforation and readmission to hospital.

**Definitions**

Therapeutic procedure: removal of a polyp ≥ or = to 1 cm, or removal of 3 or more small polyps.

Sedation: conscious sedation with either Midazolam and/or Fentanyl.

Bowel preparation: only classified as 'poor' if bowel preparation that hindered the examination or interpretation.

Caecal intubation rate (CIR): intention to treat completion rate determined by reaching the caecum, terminal ileum or neo-terminal ileum

Procedural time: time (minutes) from rectal examination to withdrawn out of the patient.

Post procedure complication was defined as; perforation, hypoxia, cardio-respiratory arrest, pathological tachycardia, shock, haemorrhage, aspiration, vaso-vagal episode, hypotension, intracerebral event, patient injury, admission to hospital within 8 days and any death (mortality) occurring within 30 days.

**Patient assignment, inclusions and exclusions**

Prior to patient selection a number of factors were taken into account:

1) Therapeutic procedures (polypectomy) lead to increased procedure time and complication rates, which could potentially influence patient satisfaction; this was controlled by assigning equal proportions within each group.

2) Complex procedures such as Endoscopic Mucosal Resection (EMR) were excluded due to the small numbers for comparison, inherent increased procedure times and complications, which would impact the patient experience.

3) Cancer diagnosis was excluded as this could potentially bias the patient satisfaction and created an ethical dilemma for the interviewer.

4) Colonoscopies performed by nurse endoscopists (non-medical) were excluded, as it is well-established specialist nurses impact significantly on patient experience.

5) Procedures performed in the NON-BCSP group by colonoscopists accredited for BCSP were excluded as the study aim was to look at the impact of accreditation and this accreditation could be the important factor for patient experience.

6) Heterogeneity: NON-BCSP group would be more heterogeneous compared to the BCSP group, and therefore recruitment was biased 2:1 in favour of the former group (NON-BCSP n=480 & BCSP n=240) in-order to allow analysis to determine the potential impact of confounding factors.

7) Random assignment. From the electronic computer reporting system and audit tool (Unisoft) patients that had a colonoscopy were downloaded onto an Excel (Microsoft Office) spread sheet. These were filtered to BCSP and NON-BCSP groups and into diagnostic and therapeutic procedures. Patients were then randomly assigned to telephone interviewers.

**Statistical methodology**

Continuous and ordinal variables are summarised as median and interquartile range; categorical variables are summarized as proportions. Mann-Whitney U and Chi-square hypothesis tests were used in exploratory univariate comparisons of patient demographics between groups.

Responses to survey questions were compared using ordinal logistic regression (OLR), first with and then without adjustment for confounding variables. The following potentially confounding variables were incorporated into the adjusted analyses: age, gender, sedation status, procedure length, bowel preparation quality, comorbidity, therapeutic procedure, ASA score, adenoma detection and achievement of caecal intubation. Secondary unadjusted analysis of each survey question was conducted using the Mann-Whitney U test and the results compared with the unadjusted OLR analysis.

In this study, where the assumption of proportional odds did not hold, a generalised ordinal logistic regression model was applied. However, in all cases the improvement in model fit was marginal (as measured by Akaike’s Information Criterion) and the interpretation of results was unchanged. The difference in predicted probabilities was also very small.

Although crude (and tending to overcorrect), the Bonferroni correction was used to adjust P-values for multiple comparisons, using the number of response variables as the correction factor (i.e. 5).

Kendall’s Tau-A was used to assess the association between questions 3 and 5, ‘Pain’ and ‘Comfort’ respectively in order to provide a measure of questionnaire validation.

Analyses were conducted using Stata 12.0 (StataCorp. 2011. Stata Statistical Software: Release 12. College Station, TX: StataCorp LP).

**Results**

**Patient participation and demographics**

Four-hundred and eighty-eight patients completed the study (68% uptake rate). Those who did not complete included; patients who did not call back after 2 attempts (n=136), not wanting to participate (n=25), complex colonoscopic procedures (n=36), patient unavailable (n=11), incorrect contact details (n=20), malignancy on histology (n=4).
BCSP contained 131 patients and NON-BCSP, 357 patients. The demographic and colonoscopic details are shown in Table II. Whilst there was a preponderance of males (63 v 51%; p=0.02) in BCSP, there were no differences for age (p=0.25), ASA grade (p=0.7) or presence of multiple co-morbidity (p=0.9). The proportion of asymptomatic patients that underwent colonoscopy in the NON-BCSP group was 35% (see Table II full details).

<table>
<thead>
<tr>
<th>Variable</th>
<th>BCSP % or Median (IQR)</th>
<th>NON-BCSP % or Median (IQR)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gender</td>
<td>63% 65 (61, 69)</td>
<td>51% 65 (52.5, 73)</td>
<td>0.019*</td>
</tr>
<tr>
<td>Age (years)</td>
<td>65 (61, 69)</td>
<td>65 (52.5, 73)</td>
<td>0.25</td>
</tr>
<tr>
<td>ASA score</td>
<td>2(2, 3)</td>
<td>2(2, 2)</td>
<td>0.73</td>
</tr>
<tr>
<td>Co-morbidity</td>
<td>43% 6%</td>
<td>32% 6%</td>
<td>0.04*</td>
</tr>
<tr>
<td>Multiple co-morbidity</td>
<td></td>
<td></td>
<td>0.89</td>
</tr>
<tr>
<td>Symptomatic indication</td>
<td>0% 65%</td>
<td>&lt;0.0005*</td>
<td></td>
</tr>
<tr>
<td>Training during procedure</td>
<td>0% 47%</td>
<td>&lt;0.0005*</td>
<td></td>
</tr>
<tr>
<td>Therapeutic procedure</td>
<td>45% 42%</td>
<td>0.513</td>
<td></td>
</tr>
<tr>
<td>Sedation used</td>
<td>88% 93%</td>
<td>0.085</td>
<td></td>
</tr>
<tr>
<td>Procedure length (minutes)</td>
<td>30 (23, 73)</td>
<td>25 (19, 40)</td>
<td>0.005*</td>
</tr>
<tr>
<td>Poor bowel prep</td>
<td>5% 17%</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>Caecal intubation rate</td>
<td>99% 91%</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>Adenoma detection rate</td>
<td>44% 38%</td>
<td>0.231</td>
<td></td>
</tr>
</tbody>
</table>

* significant p-value (<0.05)

**Colonoscopy characteristics**

No difference was detected in the proportion of therapeutic procedures in the BCSP (45%) and NON-BCSP group (42%) (p=0.5).

Caecal intubation rate was higher in BCSP (99%) than in the NON-BCSP group (91%) (p=0.001) (Fig. 1).

In 12% and 7% patients no sedation/analgesia was used for the procedures within BCSP and NON-BCSP respectively (p=0.085). In addition, midazolam use was lower in the BCSP (unused in 26% v 11% for BCSP vs NON-BCSP respectively; p=0.0001) and at lower doses (1 [0, 2] vs 2 [1, 3] mg; p=0.0001) compared to the NON-BCSP. No difference in fentanyl use was detected (50 [50, 100] vs 75 [50, 75] mcg for BCSP and NON-BCSP groups respectively (p=0.97) (Fig. 2).

Hyosine bromide was used more often (54% vs 18%; p<0.0001) and in higher doses in the BCSP compared to the NON-BCSP (20 [0, 20] vs 0 [0, 60]mg; p=0.0005) (Fig. 2).

NON-BCSP reported more ‘poor’ bowel preparation at 17% compared to 5% in the BCSP (p=0.001) (Fig. 1).

The procedure time was longer in the BCSP than in NON-BCSP (30 [23, 38] vs 25 [19, 40] minutes respectively; p=0.005) (Fig. 1).

No difference was detected in the adenoma polyp detection rate (ADR) between BCSP and NON-BCSP (44% v 38%, respectively; p=0.2) nor in the number detected (1 [0, 3] vs 1[0,1] per colonoscopy respectively (p=0.05) (Fig. 1).

**Patient outcomes**

Patient expectation and experience scores were high and pain scores low in both groups (Table III), and did not differ between them in both the adjusted and unadjusted OLR analyses (Table IV) as well as the Mann-Whitney comparisons (Table III). There was a moderate correlation between the pain and comfort scores (Kendall’s Tau-A 0.5, p<0.0005).

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>BCSP Median (IQR)</th>
<th>NON-BCSP Median (IQR)</th>
<th>p-value</th>
<th>(Uncorrected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Expectation’</td>
<td>8 (7, 10)</td>
<td>9 (7, 10)</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>‘Experience’</td>
<td>9 (8, 10)</td>
<td>9 (8, 10)</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>‘Pain’</td>
<td>1 (0, 5)</td>
<td>2 (0, 5)</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>‘Repeatability’</td>
<td>4 (3, 5)</td>
<td>4 (3, 4)</td>
<td>&lt;0.0005*</td>
<td></td>
</tr>
<tr>
<td>‘Comfort’</td>
<td>1 (1, 3)</td>
<td>2 (1, 3)</td>
<td>0.04*</td>
<td></td>
</tr>
</tbody>
</table>

The scores of the 5 satisfaction questions expressed as a median [inter-quartile range] for the 2 groups and the results of the Mann-Whitney-U test. For expectation and experience (scale 0-10) the best score was 10, for pain (0-10) the best score was 0, and for repeatability (0-5), the best score was 5. For patient comfort (0-5), the best score was 0. Only repeatability was vastly different between the 2 groups with BCSP having a higher score. In BCSP group, comfort scores seemed better with trends to less pain.* significant p-value.

The groups did differ in ‘repeatability’ for adjusted, unadjusted OLR and Mann-Whitney comparisons (adjusted analysis: 0.45 (95% CI: [0.28, 0.73]), p=0.001, Bonferroni corrected: p=0.005). BCSP patients were more likely to give a higher score for ‘repeatability’ compared with non-BCSP after correcting for possible confounders e.g. the probability of a maximum score of 5 was higher in the BCSP group at 28% compared to 14% in the NON-BCSP group (Table V).

A post hoc intra-group analysis of NON-BCSP was performed to determine the effect of trainees and training on patient satisfaction compared to those performed by consultants. Adjusted analyses did not demonstrate statistically significant differences between procedures where training was or was not involved: satisfaction measures (Odds ratio [95% confidence limits]) of expectation (0.13 [0.71, 1.78]; p=0.61), experience (0.81 [0.51, 1.30];
Experience of colonoscopy and quality assurance

The 30-day post procedure mortality was 0% in both groups. One post-polypectomy syndrome recorded (0.002%) in the BCSP group related to therapeutic procedure where 5 polypectomies were performed. This required hospital and was treated conservatively (did not require surgery). There were no clinically significant cases of bleeding.

Fig 1. The differences in (a) caecal intubation rates, where BCSP had the superior caecal intubation, (b) Poor bowel preparation where bowel preparation was rated the worst by the NON-BCSP group, (c) Box plot of median and Interquartile range with bars to indicate 2nd IQR and dots for outlying data for number of adenomas detected per colonoscopy, (d) Box plot of median and Interquartile range with bars to indicate 2nd IQR and dots for outlying data for procedure duration (minutes) which shows this was greater in BCSP. *significant p-value (p<0.05).

Fig 2. a) Box plot of median and Interquartile range with bars to indicate 2nd IQR ad dots for outlying data for midazolam doses in milligrams (mg): where the lowest BCSP. (b) the percentage of patients that had no midazolam and no sedation, where the BCSP group did the most number procedures without either. (c) the Fentanyl dose (mcg) used which was similar in both groups. (d) the proportion of procedures where the antispasmodic buscopan was used which was most in the BCSP group. *significant p-value (p<0.05).

- Pain: p=0.38, mean (0.72 [0.46, 1.14]), p-value (0.17), range (0.79 [0.50, 1.26]), p-value (0.32) and willingness to repeat (1.06 [0.66, 1.69]), p-value (0.810). However, the sedation doses were lower (midazolam: 1 mg [1, 2] vs 2mg [2, 3], p=0.005), CIR superior (96% vs 85%, p<0.005) and procedure time reduced (22 [15, 32] vs 34 [20, 46] minutes; p=0.0001) in procedures performed by NON-BCSP consultants.
Discussion

This study shows that despite considerable differences in patient populations, patient processes and colonoscopist’s credentials, the better quantitative quality indicators such as caecal intubation and the lower sedation use was achieved within BCSP, yet patient satisfaction was high both inside and outside the programme.

Interestingly, whilst established quality standards of colonoscopy such as CIR and ADR [3-5] [1, 6-8] have been shown to be improved by education, training, and audit [9], until now it remained unsubstantiated, whether such interventions impacted on qualitative indicators such as patients’ experience and satisfaction [10,11]. Previous studies have shown, however, that patient satisfaction may be negatively affected by factors including female gender, long procedure times, young patient age and poor bowel preparation [12, 13]. For these reasons we identified these variables as key confounders in our study and adjusted for them to provide an unbiased comparison between the groups.

Previously, investigators have long argued that operator expertise in the technique [1] is also likely to contribute to patient experience. However, the evidence for this is weak and comes from comparisons between trainees and consultants (attendants) performances. One study, showed lower satisfaction scores for trainees performing unsedated flexible sigmoidoscopy [14], whilst another in sedated colonoscopy showed similar satisfactions scores [11]. In contrast, our study shows that all operators can achieve excellent levels of patient satisfaction when the colonoscopy is performed in a highly quality assured unit as there were very little differences in patient satisfaction scores between BCSP and NON-BCSP groups, and between trainees and consultants.

The superior CIR within the BCSP perhaps supports the notion of an ‘elite tier’ of colonoscopists created for the programme. Potentially, however, poorer bowel preparation in NON-BCSP may have contributed to the lower CIR, even though they were within national standards of an accredited unit (i.e. CIR >90%). It is unclear whether bowel preparation was a cause or effect phenomena especially when considering bowel preparation was standardized in both groups. The quality of the bowel preparation was self reported by the endoscopists only, and to remove such a subjective factor, Intention to Treat CIR is now the accepted quality standard [5], rather than adjusted rates for these factors.

For the QA standard of ADR, our control measure for therapeutic procedures nullified an effect by ensuring relative high and similar ADRs in both groups. The reasons for this control measure were four fold. Firstly, in BCSP were patients gFOB positive reported to have a high incidence of polyps [19-21]. Secondly, caecal withdrawal times studies have shown that colonoscopies with longer time have a superior ADR [22, 23] and the BCSP has a set minimum target (6 minutes). Thirdly, BCSP procedures are observed by a specialist practitioner and monitored centrally which may affect colonoscopist behaviour and practice. Finally, we wanted to control for the effect of therapeutic intervention (with increased procedure time and risks) on patient satisfaction.

Sedation use showed marked differences between the two groups within our study. Despite midazolam being used less frequently and at lower doses in the BCSP group, patient satisfaction scores were high and pain scores low for both groups. This seems quite converse to previous studies where the more sedation used resulted in improved patient comfort levels [11]. The use of sedation can lead to recall bias, and the reduced use of sedation in the BCSP group may potentially result in a negative bias for patient experience in this group, which is the converse to our findings. The

### Table IV. Survey questions analysis (Ordinal logistic regression)

<table>
<thead>
<tr>
<th>Uncorrected for confounding factors</th>
<th>Corrected for confounding factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds ratio (95% CI)</td>
<td>Odds ratio (95% CI)</td>
</tr>
<tr>
<td>Expectation</td>
<td>0.98 (0.68, 1.42)</td>
</tr>
<tr>
<td></td>
<td>0.92 (0.64, 1.34)</td>
</tr>
<tr>
<td>Pain</td>
<td>1.38 (0.95, 1.99)</td>
</tr>
<tr>
<td></td>
<td>0.087</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.44 (0.30, 0.64)</td>
</tr>
<tr>
<td></td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>Comfort</td>
<td>1.49 (1.02, 2.18)</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
</tr>
</tbody>
</table>

Correcting for confounding variables: age, gender, sedation given, procedure length, therapeutic procedure, bowel preparation quality, co-morbidity, asa, adenoma detection rate, symptomatic indication, caecal intubation rate. This table shows the OLR results for the satisfaction scores both uncorrected and corrected for confounding.

### Table V. Predicted probability (cumulative predicted probability) for each response category for the ‘Repeatability’ question for the two patient groups with all confounding variables set to constant values (the mean in each case).

<table>
<thead>
<tr>
<th>Repeatability response</th>
<th>Uncorrected</th>
<th>Corrected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>BCSP</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>NON-BCSP</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.10)</td>
</tr>
</tbody>
</table>

*As an example comparison consider the probability of scoring a 5; in the BCSP group the predicted probability is 28% whereas in the NON-BCSP group the predicted probability is 14%, These comparisons are adjusted for any baseline differences between groups.
Experience of colonoscopy and quality assurance

There were a number of weaknesses in our study. Firstly, data collection was retrospective, and factors shown to be previously important such as patient waiting times, anxiety levels, endoscopist’s manner and depth of sedation were not collected. Second, a superior study design is a randomized blinded controlled trial. However, due to central regulation of BCSP in England, this study design is implausible and, therefore, we tried to overcome many of the potential bias by (i) correcting for possible confounding variables using statistical modelling, (ii) randomizing patients to blinded interviewers with 2:1 recruitment in favour of the heterogeneous group, (iii) recruiting large patient numbers and (iv) rigorous patient selection criteria. The success of these measures is demonstrated by the tight confidence intervals within the odds ratios in the OLR analysis for our satisfaction questions, thus suggesting even small differences were likely to be detected by our study design. Third, the telephone interview questionnaire was not validated. However, there are no validated systems for this type of interview for endoscopy assessment, and thus we adapted previously published questionnaires that assessed patient satisfaction. We preferred the telephone interview method due its convenience and minimum patient disruption, which were probably important factors contributing to our excellent up-take rate for this type of qualitative study. Fourth, poor patient recall may also have been a factor in the quality of the data collection especially when dealing with sedated patients, although its use was prevalent in both groups. Alternatively, it may be argued that our primary outcome was overall patient experience, and sedation should only be considered as a supplement to this end-point. Finally, the patient journey from recruitment through to follow up of these two groups are very different, and the impact this has on patient experience, such as the role of the BCSP nurse practitioner for continuity of care and the 45 minutes of counseling received in the BCSP group, whilst likely to be important, cannot be determined by our study.

Conclusion

Our study has shown that regardless of whether a colonoscopy was performed in- or out-side of an accredited BCSP, patient experience and satisfaction was high. However, the higher repeatability scores with high patient satisfaction and low pain scores achieved with much lower sedation doses inside the programme may reflect the positive impact of the higher level of QA within the BCSP. This study also highlights that with current trends in the US and Europe of the use of deep sedation with propofol, a good patient experience of colonoscopy can be achieved with minimal conscious sedation in expert hands.

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Conflicts of interest

The authors declare there are no conflicts of interest.
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