A prospective study of colonoscopy practice in the United Kingdom today – are we adequately prepared for national colorectal cancer screening tomorrow?

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Abbreviations.

NHS National Health Service

BSG British Society of Gastroenterology

UK United Kingdom

DGH District General Hospital

ASA American Society of Anaesthesiology

JAG Joint Advisory Group

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Abstract

Aim To study the availability and quality of adult and paediatric colonoscopy in 3 National Health Service (NHS) regions.

Method A prospective four month study of colonoscopies in North East Thames, West Midlands and East Anglia.

Patients Subjects undergoing colonoscopy in 68 endoscopy units.

Results 9223 colonoscopies were studied. The mean number of colonoscopies performed over the 4-month period was 142 in district general hospitals and 213 in teaching hospitals. Intravenous sedation was administered in 94.6% of procedures but 2.2% and 11.4% of 'at risk' patients did not have continuous venous access or did not receive supplemental oxygen respectively. Caecal intubation was recorded in 76.9% of procedures but the adjusted caecal intubation rate was only 56.9%. Reasons for failing to reach the caecum included patient discomfort 34.7%, looping 29.7% and poor bowel preparation 19.6%. A normal colonoscopy was reported in 42.1%. The most common diagnosis was polyps 22.5%, followed by diverticular disease 14.9%. Inflammatory bowel disease was recorded in 13.9% and carcinoma in 3.8%. Only half the patients remembered being told of possible adverse events prior to the procedure. Rectal bleeding requiring admission following colonoscopy was reported in six patients. The overall perforation rate was 1:769 and colonoscopy was considered a possible factor in six deaths occurring within 30 days of the procedure. Only 17.0% of colonoscopists had received supervised training for their first 100 colonoscopies and only 39.3% had attended a training course.

Conclusion There is serious under-provision of colonoscopy service in most NHS hospitals. Endoscopy sedation guidelines are not always adhered to and there is a wide variation in practice between units. Colonoscopy is often incomplete and does

not achieve the target 90% caecal intubation rate. Serious complications of colonoscopy were comparable with previous studies. Training in colonoscopy is often inadequate and improved practice should result from better training.

Keywords: Colonoscopy, Training, Sedation, Completion rates, Complications

Introduction

The study of the availability and quality of colonoscopy was set up with the support of the British Society of Gastroenterology (BSG), the Royal College of Physicians of London, Royal College of Surgeons of England, Royal College of Radiologists, Association of Surgeons of Great Britain and Ireland and Association of Coloproctology of Great Britain and Ireland.

The first successful total colonoscopy using the 'fiberoptic coloscope' was reported in 1966 by Overholt.[1] By the turn of the millennium, colonoscopy had emerged as the first line imaging investigation of the colon. The procedure is more sensitive than radiological imaging and the technique offers a range of therapeutic options. However, colonoscopy is a difficult skill to master. The procedure is often painful for the patient. Over-sedation, perforation, bleeding and procedure related death remain much feared complications.

Colorectal cancer is common with more than 30,000 people being affected each year in the United Kingdom (UK).[2] Several studies have shown that implementation of a screening programme reduces mortality from colorectal cancer in asymptomatic individuals.[3-5] Pilot studies are currently underway in the UK and whichever testing strategy is deployed in a national screening programme, large scale colonoscopy will be required to remove polyps and obtain histology. In addition, long-term surveillance schedules will be necessary to prevent recurrence of benign and malignant tumours.

In the UK, there is no information on who performs colonoscopy and how they were trained. A survey conducted in 1987 indicated that only 1 in 6 of English hospitals offered an appropriate colonoscopy service.[6] The completeness of colonoscopy was also highly variable, ranging from 55% to 97%. In 1999, MacFarlane reported that only half the endoscopy units provided an adequate colonoscopy service.[7]

There have been six large prospective studies of complications following diagnostic and therapeutic colonoscopy,[8-13] and four retrospective studies of at least 10,000 patients.[14-17] These studies provide helpful benchmarks for assessing complications.

The purpose of this large multi-centre prospective study was to assess the availability and quality of colonoscopy in a cross-section of gastroenterology centres in the UK. The study provides a platform for recommending standards of practice and methods for achieving safe, high quality colonoscopy.

Methods

All hospitals in three representative National Health Service (NHS) regions were approached to participate in the study (table 1). In addition, major private health providers operating in these regions were approached to participate and several paediatric hospitals were asked to enrol (table1). Paediatric colonoscopy is a highly specialised tertiary care activity therefore paediatric units were invited to participate from outside the 3 regions chosen for the adult study.

Four detailed questionnaires were developed and printed in booklet form. The first, comprising 45 compulsory questions, recorded patient demographic details and the details of each colonoscopy. Questions were designed to record indications for the procedure, sedation practice, extent of visualisation of the colon, endoscopic diagnosis, therapeutic interventions and both immediate and 30-day complications. The second questionnaire detailed the staffing and practices of individual units. A third questionnaire recorded the training and experience of the colonoscopists, and the fourth sampled one thousand two hundred patients and their experience of the procedure.

Each unit was asked to complete the procedure-related questionnaire on all consecutive colonoscopies over a 4-month period. Wherever possible, a tick-box format was used and the pages designed to be read by Formic (Formic Limited), an automated optical scanning device with integrated data-capture software. The research fellow (JB) visited the participating units to explain the aims and objectives of the project and to discuss the questionnaires and organisational details with clinicians,

endoscopy staff, and audit personnel. In each hospital, a mechanism was established to report complications occurring within 30 days of the procedure.

Results

Sixty-eight units provided information on 9223 colonoscopies (table 1), 234 colonoscopists and 599 patients. 4/54 (7.5%) NHS units in the 3 regions failed to provide adequate data for inclusion. Only 41 of the 68 participating units returned the endoscopy unit questionnaire. The number of colonoscopies reported from the 49 NHS adult District General Hospitals (DGH) and Teaching Hospitals ranged from 55 to 346 (mean 162). Private hospitals completed returns on 9 to 458 colonoscopies (mean 83) and paediatric hospitals reported on 10 to 46 procedures (mean 24). DGHs provided information on almost two-thirds of the colonoscopies. The sex ratio and functional status of patients undergoing colonoscopy is indicated in table 2. The ages of the adult population ranged from 16 to 95 years old (mean 58) and 14.1% were 75 years or older.

Indications for colonoscopy

Diagnostic procedures accounted for 61.2%, therapeutic for 6.8% and surveillance for 40.3%. More than one indication was recorded in 36% of patients. The most common indications for colonoscopy were investigation of rectal bleeding (19.9%), followed by polyp follow up (16.5%), change of bowel habit (14.6%), diarrhoea (11.8%), abdominal pain (10.9%) and previous colorectal cancer (10.7%).

Bowel preparation

A single policy on bowel preparation was used by 34/41 (82.9%) units. In the remainder, individual colonoscopists determined their preferred regimen. Most units favoured a single agent bowel preparation. Sodium picosulphate (Picolax) was used in

36.8% of examinations, polyethylene glycol preparations (Klean Prep) in 20.7% and sodium phosphate (Fleet) in 15.6%.

Sedation practice, reversal agents and antispasmodics

Prior to sedation, the functional status of all patients was recorded according to the American Society of Anaesthesiology (ASA) classification of physical status (table 2). Patients are classified 'at risk' if they are in ASA class 3 or above. ASA class 3 or 4 was recorded in 3.4% of patients. Continuous intravenous access was established in 93.1% of patients. In those with continuous intravenous access a plastic cannula was used in 7470/8583 (87%), an indwelling needle ('butterfly') in 935/8583 (10.9%), and central line in 62/8583 (0.7%). In sedated patients, supplemental oxygen therapy was administered in 6266/8721 (71.8%) and pulse-oximeter monitoring was used in 8200/8721 (94.0%). Continuous intravenous access was not established in 7/316 (2.2%) of ASA class 3 and 4 patients and supplemental oxygen was not administered to 36/316 (11.4%) of 'at risk' patients.

Sedation was administered in 94.6% of the procedures. A range of sedative and analgesic regimens was reported. The most common combination was pethidine and midazolam (57.8% of colonoscopies) and there was a wide range of doses. The mode dose of midazolam was 5.0mg (range 0.5-20.0mg) with 1956/7707 (25.4%) receiving greater than 5mg. The mode dose of diazemuls was 10 mg (range 1.0 -30.0mg), with 76/901 (8.4%) receiving greater than 20mg. The mode dose of pethidine was 50 mg (range 10-100mg). In patients receiving combined sedation and analgesia, the benzodiazepine was administered prior to the opiate in 2087/7533 (27.7%) of patients.

In paediatric units, 65.6% of colonoscopies were performed under general anaesthetic. In adults, colonoscopy under general anaesthesia was reported in 1.3% of private, 0.3% of DGH and 0.2% of teaching hospital patients.

Reversal agents (e.g. flumazenil and naloxone) were administered in 3.4% of procedures. Indications for reversal included ‘routine use’, ‘slow to recover’, ‘end of list’, ‘respiratory depression’, and ‘unresponsiveness’. Hyoscine butylbromide (Buscopan) was administered in 20.6% of procedures and almost always as a 20mg dose.

The colonoscopic examination

Caecal intubation

A “complete colonoscopy” refers to the passage of the colonoscope to the caecum or terminal ileum. The endoscopist assessed completion of the colonoscopy by using one or more landmarks to identify the caecum. These included transillumination (34.7%), tri-radiate fold (70.0%), appendiceal orifice (42.7%), ileo-caecal valve (67.9%), intubation of terminal ileum (19.7%), finger indentation of right iliac fossa (44.7%) and fluoroscopy (0.6%).

In 2.3% of procedures no indication was given as to the extent of the examination. One or more identifying landmarks of caecal intubation were reported in 76.9% of procedures. The intubation rate for DGHs was 4326/5805 (74.5%), teaching hospitals 1632/2130 (76.6%), private hospitals 1046/1166 (89.7%) and paediatric hospitals 90/122 (73.8%). Only 13/68 (19.1%) units achieved a 90% intubation rate (1 DGH, 3 teaching, 6 private and 3 paediatric).

Intubation of the terminal ileum or visualisation of the ileo-caecal valve are the only reliable landmarks of complete colonoscopy. When either or both of these two landmarks was recorded to define a complete procedure, only 5251/9223 (56.9%) of colonoscopies could be objectively confirmed as complete. Using this adjusted caecal intubation rate, only two hospitals achieved a 90% caecal intubation rate.

The caecal intubation rate for patients of ASA status 1, 2, 3 and 4 was 5367/6673 (80.4%), 1342/1827 (73.5%), 185/279 (66.3%), and 24/37 (64.9%) respectively. When three age groups were considered independently (under 16 years old, 17-75 years old and older than 75), caecal intubation rates were 131/169 (77.5%), 5867/7513 (78.1%) and 917/1297 (70.7%) respectively. When gender was analysed, caecal intubation for males was 3712/4614 (80.5%) and 3341/4549 (73.4%) for females. Completion rate for single agent bowel preparation was 1180/1438 (82.1%) for sodium phosphate (Fleet), 2473/3398 (72.8%) for sodium picosulphate (Picolax) and 1542/1906 (80.9%) for polyethylene glycol preparations (Klean prep). The caecal intubation rate was similar whether hyoscine butylbromide was given, 1529/1901 (80.4%) or not 5565/7322 (76.9%).

The caecal intubation rate was lower in the presence of a stricture. Caecal intubation was reported in only 6/30 (20%) malignant strictures and 36/98 (36.7%) benign strictures. In patients with non-stricturing tumours the caecal intubation rate was 173/319 (54.2%). Completion rate in the presence of polyps was 1713/2072 (82.7%), diverticular disease 1053/1376 (76.5%) and inflammatory bowel disease 1010/1285

(78.6%). The proportion of normal examinations that were complete was 2972/3880 (76.6%).

The caecal intubation rate for consultant gastroenterologists was 3245/3881 (83.6%), gastroenterology trainees 1074/1333 (80.6%), coloproctologists 1498/2094 (71.5%), surgical registrars 234/338 (69.2%) and staff grades / associate specialists 739/1001 (73.8%).

Causes of failure to complete the procedure

In 1913/9223 (20.7%) procedures the endoscopist was unable to complete the colonoscopy. A planned limited examination was the sole reason for incomplete colonoscopy in only 1.1% of procedures. One or more reason was given for aborting the procedure. The most common cause was patient discomfort (34.7%), followed by uncontrolled looping (29.7%), poor bowel preparation (19.6%), diverticulosis (9.5%) and adequate delineation of subtotal colitis (2.0%). The caecum had been resected in 138/1913 (7.2%) patients and in 107/1913 (5.6%) patients a tumour prevented proximal inspection of the colon. In 55/1913 (2.9%) patients, reasons for failing to complete the procedure included bradycardia, nausea and vomiting, hypoxia and hypotension.

Diagnosis

A diagnosis was not recorded in 3.7% of questionnaires. A normal colonoscopy to the point of maximum insertion was reported in 42.1% of procedures. A single diagnosis was reported in 39.4% and more than one diagnosis in 14.9%. The most common

diagnosis was polyps 22.5%, followed by diverticular disease 14.9%. Inflammatory bowel disease was recorded in 13.9% and carcinoma in 3.8%.

Therapeutic colonoscopy

Polyps were reported in 2072/9923 (22.5%) colonoscopies. Polypectomy was undertaken in 1880/2072 (90.7%). All polyps were judged completely removed in 1440/1880 (76.6%). In 340/1880 (18.1%) colonoscopies where polypectomy was undertaken the polypectomy was incomplete. Where polyps were identified the caecal intubation rate was 1713/2072 (82.7%).

Status of the colonoscopists

Consultants performed the majority of colonoscopies. Consultant gastroenterologists, physicians and paediatricians performed 42.1% of procedures, consultant coloproctologists and general surgeons 22.7% and staff grade, associate specialists and general practitioners 10.9%. Medical trainees performed 14.5% of the colonoscopies and surgical trainees 3.7%.

Training of colonoscopists

It is recommended that trainees should be closely supervised for their first 100 colonoscopies.[18] Of the 234 colonoscopists responding to the endoscopist questionnaire, only 17.0% had received supervised training for their first 100 colonoscopies. The percentage of initial procedures supervised for consultant gastroenterologists, physicians and paediatricians was 19.6%, consultant coloproctologists and general surgeons 12.2%, staff grade, associate specialists and general practitioners 33.3%, medical trainees 16.7% and surgical trainees 0%.

Only 39.3% of colonoscopists had ever attended a formal colonoscopy training course. Courses had been attended by 51.9% of consultant gastroenterologists, physicians and paediatricians, 37.1% of consultant coloproctologists and general surgeons, 66.7% of staff grade, associate specialists and general practitioners, 21.7% of medical trainees and 15.8% of surgical trainees.

Complications

Readmission within 30 days

Of the 9223 patients, 114 (1.2%) patients were admitted to hospital within 30 days of their colonoscopy. The most common reasons for admission were abdominal pain (23.7%), malignancy (8.8%), angina or myocardial infarction (7.0%), general deterioration (7.0%), observation (5.3%), cerebrovascular accident (3.5%) and pneumonia (2.6%). Of these 114 patients, 39 (34.2%) patients were admitted for elective surgery, both related and unrelated to the colonoscopy.

Bleeding following colonoscopy

Bleeding after colonoscopy was reported in 13 patients. Six patients were admitted with rectal bleeding. One patient with bleeding had diverticular disease at colonoscopy and went on to have angiography but no bleeding point was identified. One patient who had undergone gastroscopy and a normal colonoscopy for iron deficiency was re-admitted with melaena indicating upper rather than lower gastrointestinal bleeding. The other four patients had undergone snare polypectomy (2), cold biopsy (1) and cold biopsy with snare (1). In all these patients, the bleeding stopped without intervention or need for transfusion.

There were a further 7 reports of bleeding. Five of these had either cold biopsy (2), or polypectomy (3) and in 3 of these patients rectal bleeding was the original indication for the colonoscopy. One patient on warfarin had a polyp identified at colonoscopy but there was no record of intervention and a further patient underwent colonoscopy for rectal bleeding and the patient again reported bleeding after the colonoscopy although no pathology had been identified.

A further 21 patients had bleeding requiring active intervention at the time of colonoscopy. This followed snare polypectomy (11), hot biopsy (5), cold biopsy (2), hot biopsy and snare without cautery (1), hot biopsy and snare with cautery (2). Interventions to stop bleeding included diathermy, adrenaline injection and stalk snaring.

Perforation during colonoscopy

Perforation was reported in 12 patients (7 males and 5 females, age range 30-93). The overall perforation rate was 1:769. In 6 patients the perforation was recognised at the time of colonoscopy. In 2 patients the complication was recognised prior to anticipated discharge and the remainder presented 1, 7, 16 and 24 days after the procedure. The site of perforation was recorded in 4 of the 12 patients (2 rectal and 2 sigmoid). Only 4 of the perforations followed intervention. Two were associated with snare polypectomy, 1 with hot biopsy and 1 with hot biopsy and snare polypectomy. A hot biopsy or other therapeutic procedure was undertaken in 20.0% of colonoscopies and in these, the perforation rate was 4/1841 (1:460). No cold biopsy was complicated by perforation. In 80.0% of colonoscopies no intervention or only

cold biopsies were performed. In this 'non-interventional group' the perforation rate was 8/7382 (1:923).

Deaths following colonoscopy

Ten deaths were reported within 30 days of the procedure (age range 53 - 88). In 5 of these patients, the colonoscopy was normal. A polyp or tumour was present in 3 patients and melanosis coli and angiodysplasia were diagnosed in 2 patients. Colonoscopy was considered a possible factor in 6 patients whilst carcinomatosis was thought to have been the cause of death in 3 patients. One patient died in the 30 day period following a repair of an aorto-jejunal fistula.

In those patients where the colonoscopy might have been a factor in the patient's death, 4 were inpatients at the time of colonoscopy. The causes of death were stroke, bronchopneumonia, myocardial infarction and bronchopneumonia with septicaemia respectively. One patient died at home from left ventricular failure following a myocardial infarct and a further patient was admitted 19 days after colonoscopy and died of bronchopneumonia, cirrhosis and cardiac failure.

Patient questionnaire

Of the 1200 questionnaires sent to patients, 599 (49.9%) were returned for analysis. Written information explaining the procedure was received by 81.5%. Written consent was obtained in the procedure room in 54.8% of procedures and 29.9% were consented immediately prior to the colonoscopy but outside the procedure room. Written consent was obtained in the outpatient department in 10% of patients and 5.3% couldn't remember where they had provided consent. Information on possible

adverse events was recalled by 54.9% and mention of “bleeding” and “perforation” were recalled in 95/329 (28.9%) and 96/329 (29.2%) respectively.

Discussion

The potential of colonoscopy can only be realised if the procedure is completed safely with good visualisation of the mucosa. This multi-centre study is the first large-scale prospective evaluation of colonoscopy practice in a cross section of teaching hospitals, district general hospitals, private hospitals and paediatric units.

Over the past 15 years there has been an increasing demand for colonoscopy in the United Kingdom. In 1987, it was recommended that 160 colonoscopies should be provided annually for a population of 100,000.[6] In 1990 the BSG recommended that approximately 200 colonoscopies per annum would be required to provide a service for a population of 100,000.[19] In 2001, the BSG working party suggested that the average District General Hospital (DGH) should plan for an annual workload of 800-1000 lower gastrointestinal procedures per 100,000 population.[20] This represents a five fold increase in expectation over 15 years.

In this study, 39 DGHs performed a mean of 149 colonoscopies over the 4-month period (equating to 447 per annum). The 10 teaching hospitals performed a mean of 213 procedures (equating to 639 per annum). Many hospitals participating in the study serve populations well over 100,000 indicating that there is serious under-provision of colonoscopy in most hospitals.

Approximately two thirds of colonic disease is within reach of a 60cm flexible sigmoidoscope and many diagnoses are within range of a rigid sigmoidoscope. In this

study only half the patients found to have a malignant-looking tumour at colonoscopy had previously undergone rigid or flexible sigmoidoscopy.

Excellent bowel preparation is a pre-requisite for good quality colonoscopy. Poor bowel preparation is associated with prolonged intubation time.[21] Bowel preparations usually include sodium phosphate (e.g. Fleet), magnesium salts (e.g. Picolax) or polyethylene glycol (e.g. Klean prep). A meta-analysis of sodium phosphate and polyethylene glycol showed sodium phosphate yielded a better preparation and was better tolerated by patients than polyethylene glycol.[22] Two studies comparing magnesium salt with sodium picosulphate (Picolax) and polyethylene glycol showed sodium picosulphate to be better tolerated by patients.[23;24] Sodium picosulphate also gave better bowel preparation.[24] Two studies comparing sodium phosphate with sodium picosulphate showed better preparation with sodium phosphate in one study and a similar outcome from both preparations in the other.[25;26] Despite these publications sodium phosphate was the least used preparation in our study. Sodium picosulphate was the most commonly used cleansing agent followed by polyethylene glycol. It is of interest that the caecal intubation rate was higher for sodium phosphate than sodium picosulphate (82% and 73% respectively) and that the polyethylene glycol preparation was similar to sodium phosphate.

Endoscopy guidelines recommend the routine placement of an intravenous plastic cannula prior to the procedure.[27] Use of a ‘butterfly’ needle is considered unsafe.[28] Prior to colonoscopy, 87% of patients were cannulated with a plastic

cannula and in 11%, a ‘butterfly’ needle was used for venous access. Continuous intravenous access was not established in 2.2% of high risk patients.

Supplemental oxygen is recommended when patients are sedated. Oxygen was administered to 72% of patients who received sedation but 11.4% of high risk patients did not receive supplemental oxygen.

Prior to colonoscopy, most patients receive a combination of intravenous sedation and analgesia. Midazolam is generally the sedative of choice for short-term sedation.[29] Midazolam plus pethidine is the most frequently used regimen (57.8% of colonoscopies). The recommended dose of midazolam for sedation is usually 70mcgs/kg (i.e. 5mg for a 70kg patient) and diazepam 10-20mg.[30] This study indicates that a significant number of patients receive more than the recommended sedative dose of benzodiazepine. 25% of patients receiving midazolam had greater than 5.0mg and 8% of patients receiving diazemuls had greater than 20mg, (36% received more than 10mg).

When combined sedation and analgesia is administered, pethidine should be injected before the benzodiazepine as this allows safer titration of the sedative drug.[31] In this study 28% of patients were given the benzodiazepine prior to pethidine. Single agent sedation was used in approximately 13% of patients and unsedated colonoscopy in 4%.

Despite evidence that patient administered nitrous oxide/oxygen inhalation provides analgesia equivalent to opiates and results in less desaturation and quicker recovery

times, only 1% of colonoscopists use this approach to conscious sedation.[32-34] One controlled trial has indicated that the antispasmodic hyoscine butylbromide (buscopan) increases the speed of colonoscope insertion.[35] Teaching hospitals and DGHs used hyoscine butylbromide in 17.7% and 15.7% of procedures respectively whilst its use was reported in 52.7% of procedures in private hospitals. Caecal intubation rates were similar for procedures with and without hyoscine butylbromide.

The aim of colonoscopy is to inspect the entire colon and competent colonoscopists intubate the caecum in at least 90% of patients.[18] The caecum can only be positively recognised by visualising the ileocaecal valve.[36] Other signs, including transillumination, identification of the tri-radiate fold, appendix orifice and finger indentation over the right iliac fossa may provide misleading information.

In this study the definition of a colonoscopy did not include examinations where the express purpose was to perform a limited left sided examination. Caecal intubation was reported in 76.9% of procedures. However, when identification of the ileocaecal valve or intubation of the terminal ileum were the only criteria used for successful colonoscopy, just 56.9% of procedures could be considered complete. This indicates that completion rates are unacceptably low.

The colonoscopist judged caecal intubation and there was no independent verification. Caecal intubation based on landmarks other than visualisation of the ileocaecal valve or terminal ileal intubation almost certainly overestimate completion rates. Restricting a complete colonoscopy to only those reports that positively identified the ileo-caecal valve or intubated the terminal ileum provides an objective measure of completion

and the adjusted intubation rate is considerable cause for concern. The difference between the overall and adjusted caecal intubation rate may reflect subjective optimism by the endoscopist who fails to recognise the importance of ileocaecal valve identification.

There was an inverse relationship between caecal intubation rate and increasing patient morbidity and age. Older and ill patients are more likely to require two investigations for complete assessment and therefore in some units, barium enema or computed tomography pneumocolon might be considered as an alternative first line investigation for these patients.

Completion rates were markedly reduced in the presence of a benign or malignant stricture, 37% and 20% respectively. However in patients with tumour but no stricture the caecal intubation rate was only 54%, therefore half will require a further colonoscopy to examine the proximal colon for synchronous lesions.

Previous studies identify colonoscopy is more difficult in females.[14;21] This is reflected in our study where caecal intubation rates for men and women were 81% and 73% respectively.

Using their own criteria for caecal intubation, colonoscopists reported failure to reach the caecum in 21% of cases. The commonest reasons for incomplete colonoscopy were patient discomfort 35.3%, looping 30.3%, and poor bowel preparation 19.8%. There is considerable scope for addressing each of these complications. Patient

discomfort and looping often reflect poor technique. Scrupulous attention to preparation should also reduce the number of failed procedures.

Eighty three percent of colonoscopists reported that close supervision was not provided in the early learning period and 61% had never attended a formal training course. The caecal intubation rate was higher when colonoscopy was performed by consultant gastroenterologists, physicians and paediatricians (84%) and medical trainees (81%). Lower completion rates were recorded for consultant coloproctologists and general surgeons (71.5%) and surgical trainees (69.2%). The caecal intubation rate for staff grade endoscopists, associate specialists and general practitioners was 74%. The different completion rates for medical and surgical endoscopists might reflect differences in training and case mix. Medical endoscopists received more supervision and course work than surgeons did, and this may account for some of the difference. There is considerable scope to formalise training with a view to accreditation and all colonoscopists should be encouraged to develop a plan for improving practice.

Polyps and diverticulosis accounted for the most common diagnoses. An abnormality was discovered in 54% of procedures. When inflammatory bowel disease assessment, rectal bleeding or clarification of barium enema were prime indications for colonoscopy, pathology was discovered in more than half the patients. When change of bowel habit or abdominal pain was the sole indication, more than 60% of colonoscopies were reported as normal.

Polyps were discovered in 22.5% of patients and polypectomy was attempted in the majority. Incomplete polypectomy was reported in 1 in 5 colonoscopies. Failure to deal effectively with polyps leaves diagnostic uncertainty and the need to repeat the procedure. The high rate of incomplete polypectomy requires further analysis but might relate to issues of skills training.

The most serious complications of colonoscopy are perforation, bleeding and death. For comparison, summaries of previous studies reporting complications of colonoscopy are summarised in table 3. In this study, significant bleeding requiring admission to hospital occurred in 6 patients (1:1537), and rarely required intervention. 12 patients experienced myocardial infarction and/or cerebrovascular accidents. Perforation was recorded in 1:769 patients. In 'non interventional' colonoscopies 8 perforations were recorded (0.1%) and in 'interventional' colonoscopies 4 perforations were recorded (0.2%).

Of the 10 deaths occurring within 30 days of the procedure, 4 were considered to be due to severe co-morbid disease rather than the procedure itself. It is likely that these patients were extremely ill at the time of colonoscopy. The procedure related mortality was 1:1537. Overall, the bleeding and perforation rates were within the expected range but the mortality rate was higher than previously quoted.[37] The increased mortality rate might be attributed to the design of the study as no other study has specified a 30 day follow up period.

The patient questionnaire indicates most had received some form of written instruction and/or explanation prior to the procedure but the majority of patients were

unaware of the major risks associated with colonoscopy. Despite recommendations that consent is sought before the patient arrives for the procedure, most patients are asked to provide consent immediately prior to the procedure and often in the endoscopy room.[38] It should be possible for the consent procedure to be reassessed and changed in those units not compliant with best practice.

In summary, this cross sectional study of colonoscopic practice indicates that there is currently underprovision of colonoscopy in the NHS. Screening of high risk individuals is already recommended in the UK and it has been estimated that this will require 1.25 colonoscopy sessions per week for a DGH (assuming 6 colonoscopies per session and a population of 250,000).[39;40] It has been estimated that introduction of a faecal occult blood screening programme would require at least one extra colonoscopy session per week in a DGH.[40] Unless there is a dramatic increase in manpower and resources available for lower gastrointestinal investigations, the introduction of a national screening programme would rapidly overburden already inadequate facilities.

A national agenda is necessary to address the shortfalls in current colonoscopic practice. The unacceptably low caecal intubation rate and inadequate polyp removal rate can be improved with better training. Accessible and ongoing training should be made available to both trainees and more experienced endoscopists. Teaching colonoscopy requires considerable skill and the recent establishment of “training the trainers” courses is a critical innovation which should ultimately improve performance.

In conclusion, this study of colonoscopic practice indicates that whilst there are centres where practice is of the highest quality, considerable effort is required to raise the overall quality of colonoscopy. High calibre early training, regular refresher courses, peer review and continuous audit of standards at a local and national level must emerge from this study as a priority for all endoscopists performing colonoscopy.

We are very grateful to all the endoscopy units, clinicians, endoscopy staff and audit personnel who participated in the study and without whose help the project would not have been feasible.

We thank SmithKline Beecham Pharmaceuticals for their financial support in setting up the project and Chris Romaya of the BSG Administration office.

The project was supported by the British Society of Gastroenterology, the Royal College of Physicians of London, Royal College of Surgeons of England, Royal College of Radiologists, Association of Surgeons of Great Britain and Ireland and Association of Coloproctology of Great Britain and Ireland.

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