

Research



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## Appropriate use of colonoscopy in Nigeria: a retrospective study using the American Society for Gastrointestinal Endoscopy (ASGE) 2012 guidelines

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## Abstract

**Introduction:** colonoscopy is the standard investigation for assessing colonic disease, with moderate yield. The American Society of Gastrointestinal Endoscopy (ASGE) published guidelines to tailor the appropriate use of colonoscopy. The aims of this study were to determine the frequency at which colonoscopy was performed for an appropriate indication based on ASGE's 2012 guidelines, and to determine if there was an association of appropriateness of indication with endoscopic findings. **Methods:** a retrospective study of colonoscopies performed in a private endoscopy centre in Lagos, Nigeria, between January 2014 and December 2016. Ethical approval was obtained before commencement. Data retrieved were basic demographics, indication of, and findings at colonoscopy. Data were analysed using SPSS 23. A  $p$ -value of  $<0.05$  was considered significant. **Results:** altogether 627 colonoscopies were performed, 464 (74%) were male, mean age was 53.6 ( $\pm$  14.3) years, 255 (40.7%) were younger than 50 years. Colonoscopy was appropriately indicated in 450 (71.8%). Women were nearly twice as likely to have an unnecessary procedure than men. The overall diagnostic yield of 39.6% was similar in appropriately (41.6%) and inappropriately (34.5%) indicated procedures. Older age, abdominal mass on imaging or examination, unexplained weight loss and chronic constipation were independently associated with diagnostic yield. The pooled sensitivity and specificity of the ASGE guidelines for significant endoscopy findings were 75%, and 31% respectively. **Conclusion:** there was a high rate of unnecessary colonoscopies, especially in women. Older patients, and those with chronic constipation, unexplained weight loss and an abdominal mass, should be referred for urgent colonoscopy.

## Introduction

Colonoscopy is one of the most commonly used investigations for assessing colonic disease. In recent times, it has become more available in

Nigeria. However, the overall yield for endoscopic abnormalities is reported to be moderate, ranging between 64-85% [1-5]. Some local workers have suggested that this moderate yield may be attributed to the colonoscopies not being appropriately indicated [1,4]. The American Society for Gastrointestinal Endoscopy (ASGE) published guidelines on the appropriate use of endoscopy, including colonoscopy, in the evaluation of gastrointestinal (GI) disease [6]. These guidelines are meant to help professionals perform endoscopy procedures only when necessary, thus preventing waste of resources. Studies have shown that the yield of colonoscopy is significantly increased if the procedure is performed for an indication listed by the ASGE guidelines [7-9]. Other studies have shown that the appropriateness of the indication may be dependent on the specialty of the referring physician, with Gastroenterologists (adult and paediatric), and Internists having the highest rates of appropriate referrals [7,10,11]. Colonoscopies performed on admitted patients were also more likely to be appropriately indicated than those performed on out-patients [7]. One study showed that education of Family Physicians on the appropriate indications for colonoscopy led to a significant reduction in the rate of inappropriate referrals, resulting in economic savings and reduction in the colonoscopy waiting list [12].

While some studies show that nearly all cases of colonic neoplasms are detected in appropriately referred patients [9,13], others point out that serious colonic pathology, including neoplasms, may be missed if the guidelines are followed strictly, because the appropriateness of the indication was not predictive of significant findings [10,14]. A study from Sudan, while confirming the usefulness of the ASGE guidelines in improving diagnostic yield and reducing the rates of inappropriate referrals, recommends that patients over 50 years who present with lower gastrointestinal symptoms should undergo a first colonoscopy even if the indication appears inappropriate [8]. With the recent increase in the

demand for, and the availability of colonoscopy in Nigeria, coupled with the high cost of the procedure, there is need for appropriateness to tailor the indications for the procedure, as well as to increase yield. There is a lack of data on the appropriateness of indications for colonoscopy in Nigerian patients. The aims of this study were to determine the frequency at which colonoscopy was performed for an appropriate indication based on the ASGE guidelines, and to determine the association of appropriateness of the indication with endoscopic findings.

## Methods

This was a retrospective study of the colonoscopy records of all adults who underwent colonoscopy at the endoscopy suite of a private endoscopy centre in Lagos State, Nigeria, over a three-year period-between January 2014 to December 2016. This centre receives referrals for endoscopy both from within and outside the state. Ethical approval was obtained from the Lagos University Teaching Hospital Health Research Ethics Committee before the commencement of the study. The following data were retrieved for analysis: basic demographic data, the indication for the procedure, and the endoscopic findings. The ASGE guidelines published in 2012 were used to determine the appropriateness of the indications for the procedure [6]. An indication was deemed to be “appropriate” if it was classified as “generally indicated” by the ASGE. All other indications (including those categorized as “generally not indicated”, or “generally contraindicated” by the ASGE, and those not listed by the ASGE) were classified as “inappropriate”. Procedures that were not completed for any reason (inadequate bowel preparation or uncooperative patient), and proctosigmoidoscopy procedures, were excluded. The diagnostic yield was defined as the ratio of significant findings on colonoscopy to the total number of procedures performed. The following were considered as significant findings: tumours, polyps, diverticulae, and colitis, while the following were not considered as significant: normal

colonoscopy, haemorrhoids, and anal fissures. Data were analysed using SPSS version 23 (SPSS Statistics for Windows, version 23.0, IBM Corp. USA). Basic descriptive statistics were performed and displayed as frequency tables. Continuous data and categorical data were compared using Student’s t-test,  $\chi^2$  test and Fisher’s exact test, where appropriate. The frequencies at which colonoscopy was performed for appropriate and inappropriate indications were calculated, the association between appropriateness of indication and significant finding on colonoscopy was determined, and the sensitivity and specificity of the ASGE guidelines for detection of significant findings on colonoscopy in Nigerian patients were also calculated. A p-value of <0.05 was considered to be significant.

## Results

**Basic characteristics of study population:** a total of 627 colonoscopy procedures were performed during the study period, comprised of 464 males (74%), and 163 females (26%), with overall mean age (SD) years of 53.6 (14.3) years. Of these, 255 (40.7%) subjects were younger than 50 years, while 372 (59.3%) were at least 50 years old. These are shown in Table 1.

**Indications for colonoscopy:** four hundred and fifty procedures (71.8%) were performed for appropriate indications, while 177 (28.2%) were inappropriate (Table 2). The two most common appropriate indications were haematochezia/positive faecal occult blood test (344, 54.9%), and screening/surveillance for colonic neoplasia (60, 9.6%), while the two most common inappropriate indications were chronic constipation (48, 7.7%) and dyspepsia (38, 6.1%). The mean ages of subjects who had colonoscopy for appropriate or inappropriate indications were similar, 53.7 ( $\pm$  14) versus 53.4 ( $\pm$  15) years ( $p=0.86$ ), also the frequency of procedures performed for an appropriate indication was similar in those younger than 50 years compared with older patients (70.2% versus 72.8%  $p=0.47$ ). Women were nearly twice as

likely as men to have an inappropriately indicated colonoscopy (35% versus 26%, CI 1.5, 95% OR 1.1-2.3).

**Diagnostic yield of colonoscopy:** a total of 129 (20.6%) colonoscopy procedures were normal. Colonoscopies performed for inappropriate indications were associated with more than four times the odds of being normal compared to procedures performed for appropriate indications (OR 4.5, 95% CI 3.0-6.8) There was no association between normal colonoscopy findings and gender (OR 1.2, 95% CI 0.8-1.9), or age (OR 0.98, 95% CI 0.7-1.5). A total of 248 patients had significant findings on colonoscopy, giving an overall diagnostic yield of 39.6%. The significant findings were tumours (102, 16.3%), polyps (70, 11.2%), diverticulae (59, 9.4%), and colitis (40, 6.4%). Some subjects had multiple findings. The diagnostic yield for appropriate indications (41.6%) was similar to that for inappropriate indications (34.5%),  $p=0.10$ . The diagnostic yield was not associated with gender ( $p=0.16$ ), but was positively associated with age  $\geq 50$  years (OR 4.5, 95% CI 3.0-6.8). These are shown in Table 3.

Table 4 shows the indications and their diagnostic yield. Although overall appropriateness of indication was not associated with significant findings, some individual indications were. Notably, some indications classified as inappropriate (such as chronic constipation, unexplained weight loss) were significantly associated with diagnostic yield. Dyspepsia was significantly associated with a negative colonoscopy. On multivariate analysis, the characteristics that were independently associated with significant colonoscopy findings were older age (adjusted OR 2.1, 95% CI 1.5-3.0), presence of an abdominal mass on imaging (adjusted OR 3.9, 95% CI 1.7-8.7) or examination (adjusted OR 4.7, 95% CI 1.2-17.9), unexplained weight loss (adjusted OR 2.8, 95% CI 1.1-7.3), and chronic constipation (adjusted OR 1.9, 95% CI 1.03-3.5). At least a fifth of polyps (20%), diverticulae (22%), tumours (26.5%) and colitis (40%) were found in procedures that were performed for inappropriate indications. The pooled sensitivity and specificity of the ASGE

guidelines for significant endoscopy findings were 75%, and 31% respectively.

## Discussion

To the best of our knowledge, this is the first published report on the appropriateness of colonoscopy use in Nigeria. We found 72% of all procedures to be appropriately indicated according to the ASGE guidelines [6]. This finding was as seen in other studies [8,11]. However, more than a quarter of procedures in our study was performed for indications that were either not appropriately indicated or not listed by the ASGE recommendations. This is similar to reports in other studies from across the world [10,14,15]. This high proportion of procedures without appropriate indication may be explained by the open-access nature and generally uncontrolled pattern of endoscopy referral in Nigeria. The most common appropriate indication was haematochezia, mirroring findings from other studies [7,10]. The most common inappropriate indication was chronic constipation, which is similar to findings from another study [10]. In a Portuguese study, screening/surveillance of neoplasia was the most common appropriate indication [13], while in other studies, altered bowel habits [9,11], and chronic abdominal pain/stable irritable bowel syndrome (IBS) [7,13] were the most common inappropriate indications. The differences in these study results may reflect differing patient characteristics, such as age and the differences in use of national guidelines on colorectal cancer (CRC) screening recommendations. In our study, dyspepsia and unexplained weight loss were frequent inappropriate indications. Our results show that females were more likely to be referred inappropriately for procedures, as was reported by Mangualde *et al.* in a study from a non-academic colonoscopy center [13]. In contrast to this, certain authors found no association with gender [7]. There was no association of appropriateness of indication with age, in contrast to another study in which subjects who were younger than 15 years, or

older than 50 years were unlikely to have unnecessary procedures [7].

Colonoscopy findings which we considered to be significant were tumours, diverticulae, polyps and colitis. Normal colonoscopy, haemorrhoids, and anal fissures were not considered significant findings. There was no difference in the frequency of these findings whether the indication for colonoscopy was appropriate or not. More than a quarter of the tumours were found in procedures that did not have an appropriate indication. Even though we did not consider haemorrhoids as significant findings, they were the most frequent finding in our study (53%), and are important in the management of patients. The overall diagnostic yield in patients considered to have been appropriately referred in our study was 39.6%, similar to other studies [9,10]. We did not find an association of diagnostic yield with appropriateness of indication. This is in agreement with data from Chan and colleagues [10], but in contrast with reports from other researchers [8,9,14]. Additionally, we did not find an association of diagnostic yield with gender. However, there was an association of yield with older age, comparable to another study [7], and this may reflect a higher burden of colonic disease in the older population. Among the indications which we considered to be inappropriate, chronic constipation, unexplained weight loss and an abdominal mass on examination had the highest yields, and were associated with a significant colonoscopy finding. These three symptoms may indicate advanced colorectal disease, which may be diagnosed earlier if colorectal cancer screening programmes are implemented. Our study has some limitations including it being retrospective and from a single centre, and our inability to obtain the histologic reports of the tumours. Despite these, we believe that our findings are reflective of practices in endoscopy centres in the country

## Conclusion

The results of this study show that a large proportion of colonoscopy procedures performed in Nigeria may be unnecessary, especially in women, and guidelines may be used to help tailor referrals and maximize efficient use of limited resources. The appropriateness of indication not determine endoscopic yield. Older patients, and those with chronic constipation, unexplained weight loss and an abdominal mass should be referred for colonoscopy. African countries might need to develop their own colonoscopy guidelines, including CRC screening programmes. Furthermore, it is hoped that this work will stimulate further research to determine the framework for endoscopy appropriateness in an African context.

### *What is known about this topic*

- *Colonoscopy has a moderate diagnostic yield;*
- *Colonoscopy has a moderate diagnostic yield;Haematochesia is the most frequent indication for colonoscopy.*

### *What this study adds*

- *More than a quarter of colonoscopies performed in Nigeria may be unnecessary;*
- *Older patients, and those with chronic constipation, unexplained weight loss, and an abdominal mass should be referred for colonoscopy*

## Competing interests

The authors declare no competing interests

## Authors' contributions

All authors contributed to the conceptualization and design of this study, collection of data, data analysis, and writing of the first draft of the manuscript. All authors wrote and approved the final draft of the manuscript.

## Tables

**Table 1:** demographic and clinical characteristics of 627 patients undergoing colonoscopy

**Table 2:** indications for colonoscopy in 627 patients

**Table 3:** clinical characteristics and diagnostic yield of colonoscopy in 627 patients

**Table 4:** indications for colonoscopy, and diagnostic yield, according to the ASGE 2012 guidelines

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**Table 1:** demographic and clinical characteristics of 627 patients undergoing colonoscopy

Characteristics	Frequency (%)
Gender Male	464 (74)
Female	163 (26)
Age, mean (SD) years	53.6 (14.3)
Age <50 years	255 (40.7)
≥ 50 years	372 (59.3)
Indication Appropriate	450 (71.8)
Inappropriate	177 (28.2)
Diagnostic yield	248 (39.6)

**Table 2:** indications for colonoscopy in 627 patients

Indication	Frequency (%)
Appropriate indications	
Haematochesia/positive faecal occult blood test	344 (54.9)
Screening/surveillance of neoplasia	60 (9.6)
Abdominal mass on CT/Barium	31 (4.9)
Unexplained anaemia	11 (1.8)
Clinically significant diarrhoea of unknown origin	5 (0.8)
Inappropriate indications	
Constipation	48 (7.7)
Dyspepsia	38 (6.1)
Unexplained weight loss	20 (3.2)
Non-specific abdominal pain	19 (3.0)
Change in bowel habit	18 (2.9)
Perianal pain	13 (2.1)
Mass on abdominal examination	12 (1.9)
Acute diarrhoea	9 (1.4)

**Table 3:** clinical characteristics and diagnostic yield of colonoscopy in 627 patients

Characteristic	Number (%)	Significant finding (yield, %)	p-value	cOR	95% CI
Male	464 (74)	176 (37.9)	0.16	0.8	0.54-1.11
Female	163 (26)	72 (44.2)			
Age ≥ 50 years	372 (59.3)	176 (47.3)	<0.005	2.3	1.6-3.2
Age <50 years	255 (40.7)	72 (28.2)			
Appropriate	450 (71.8)	187 (41.6)	0.10	1.4	0.94-1.94
Inappropriate	177 (28.2)	61 (34.5)			

cOR= crude Odd's ratio; CI= confidence interval

**Table 4:** indications for colonoscopy, and diagnostic yield, according to the ASGE 2012 Guidelines

Indication	Diagnostic yield (%)	p-value	cOR	95% CI
Appropriate indications				
Haematochezia/positive FOBT	135 (39.2)	0.9	0.97	0.7-1.3
Screening/surveillance of neoplasia	23 (38.3)	0.8	0.95	0.6-1.6
Abdominal mass on CT/Barium Studies	22 (71)	<0.005	4.0	1.8-8.8
Unexplained anaemia	6 (54.5)	0.3	1.9	0.6-6.1
Clinically significant diarrhoea of unknown origin	2 (40)	1.0	1.0	0.2-6.1
Inappropriate indications				
Mass on abdominal examination	9 (75)	0.02	4.7	1.3-17.6
Unexplained weight loss	13 (65)	0.02	2.9	1.2-7.5
Chronic constipation	26 (54.2)	0.03	1.9	1.1-3.4
Acute diarrhea	5 (55.6)	0.3	1.9	0.5-7.3
Perianal pain	6 (46.2)	0.6	1.3	0.4-3.96
Non-specific abdominal pain	8 (42.1)	0.8	1.1	0.4-2.8
Change in bowel habit	7 (38.9)	0.95	0.97	0.4-2.5
Dyspepsia	9 (23.7)	0.04	0.5	0.2-0.98

cOR= crude Odd's ratio; CI= confidence interval; CT= computed tomography; FOBT= faecal occult blood test