Scientific Research Publishing

Open Journal of Gastroenterology, 2025, 15(6), 287-298
https://www.scirp.org/journal/ojgas
ISSN Online: 2163-9469
ISSN Print: 2163-9450

Appropriateness of Indication and Diagnostic Yield of Colonoscopy in a Teaching Hospital in the Republic of Congo

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How to cite this paper: Latou, P.M.M., Latou, E.S.M., Ngaporo, N.A.I., Kolo, L.I., Mouakosso, M.N., Ibobi, M.G., Niotsebe, B.A., Ibara, B.H.A., Adoua, S.C., Ngami, R.S., Mounamou, J.F.M., Onkouo, A.M., Apendi, C.M.A. and Ibara, B.I.A. (2025) Appropriateness of Indication and Diagnostic Yield of Colonoscopy in a Teaching Hospital in the Republic of Congo. *Open Journal of Gastroenterology*, **15**, 287-298.
https://doi.org/10.4236/ojgas.2025.156027

Received: May 12, 2025
Accepted: June 21, 2025
Published: June 24, 2025

Abstract

Objectives: The aim of our work was to assess the appropriateness of colonoscopy indications according to the 2000 ASGE recommendations and their diagnostic yield at the Brazzaville University Hospital. **Methods:** This was a retrospective study. Patients over 18 years of age who underwent colonoscopy at the Brazzaville University Hospital from January 2021 to December 2022 were included. Data was extracted from colonoscopy reports and patients' medical records. That included demographic data, indications and examination results. Diagnostic yield was also determined for each indication. **Results:** Among the 156 patients studied, there were 80 men (51.3%) and 76 women (48.7%). Mean age was 56.2 +/− 15.4 years. Eighty-two (52.6%) had undergone colonoscopy for indications considered as appropriate or reasons generally indicated. Those who had undergone the examination for reasons not generally indicated according to ASGE guidelines and those whose indications were not listed in these recommendations were 21.8% and 25.6% respectively. Among significant findings, malignant lesions and chronic inflammatory bowel disease were found in 11 (7.1%) and 12 (7.7%) patients respectively. Diagnostic yield was associated with appropriate indications (Odds ratio: 6.39; CI: 2.25 - 18.15). **Conclusion:** Appropriate indications according to ASGE guidelines had a better diagnostic yield than those that were not. However, significant results were also found for indications not listed in the recommendations, hence the importance of involving clinical reasoning in the decision to undergo colonoscopy.

Keywords

Colonoscopy, Indications; Appropriateness, Diagnostic Yield, Guidelines, Congo Brazzaville

1. Introduction

Colonoscopy is a widely used examination in the management of colon pathologies [1]. Among other things, it facilitates the diagnosis and treatment of precancerous lesions or early-stage cancers, thereby improving the survival of concerned patients [2]-[4].

A significant increase in demand has been recorded in some Western countries over the last twenty years [5]-[7].

Some authors have even reported inappropriate and exaggerated demand for this examination [8] [9].

In some developing countries, such as those in Africa, access to this examination remains limited, however, due to high costs and the limited availability of the necessary equipment and skills [10]-[14].

For these reasons, it is important to determine the appropriate indications, those with a good diagnostic yield, *i.e.*, a high probability of identifying a potentially important lesion for the patient's treatment.

In 2000, the ASGE (American Society of Gastroenterology) published recommendations for the proper use of colonoscopy [15]. In Europe, similar recommendations have been issued by the European Panel on the Appropriateness of Endoscopy in the Digestive System (EPAGE) [16]. These recommendations specify the appropriate indications for this examination, with a view to reducing unnecessary prescriptions and improving its diagnostic yield.

Based on the ASGE recommendations published in 2000, which are among the most widely used in studies, our aim in this study was to assess the appropriateness of the indications for examinations performed at Brazzaville University Hospital, and the diagnostic yield of examinations performed in compliance with the recommendations.

2. Materials and Methods

The study was conducted in the gastroenterology department of Brazzaville University Hospital Center (CHUB). The Brazzaville University Hospital Center is the largest hospital in the city of Brazzaville and the only hospital in the city to have a department entirely dedicated to gastroenterology. The gastroenterology department has a digestive endoscopy unit which treats patients hospitalized in this department or from other clinical departments in the same hospital.

We conducted a retrospective, cross-sectional study of patients who underwent colonoscopy in the Brazzaville University Hospital from January 2021 to December 2022, a two-year period. Data was extracted from colonoscopy reports and

patients' medical records. They included socio-demographic data (age, sex), indication and results of the examination. Patients who had an incomplete colonoscopy for technical reasons or poor colon preparation were excluded. Technical reasons for an incomplete colonoscopy may include difficulty in reducing loops that form during the examination, or difficulty in crossing colonic angles in some cases. As colonoscopies are not performed under general anaesthetic at our center, intolerance of the examination by some patients may also explain incomplete exploration of the colon.

To determine the relevance of colonoscopy indications, we used the ASGE recommendations of 2000.

Indications were classified into three categories in accordance with ASGE guidelines: reasons generally indicated, reasons not generally indicated and "reasons not listed in the ASGE guidelines". For patients who had more than one indication for the examination, when one of the indications complied with the ASGE guidelines or classified as "reason generally indicated", only that indication was taken into account. When a patient had two indications classified as "reason generally indicated" in ASGE recommendations, we retained the indication that was more likely to be justified by the colonoscopy result.

The indication most likely to explain the colonoscopy result was also retained in the case of patients with several indications considered "not generally indicated" or not listed in the ASGE guidelines.

For patients with both an unlisted and a not generally indicated indication, we retained the indication considered as "reason not generally indicated".

Diagnostic yield for a group of patients was defined as the ratio of number of colonoscopies with significant findings to the total number of examinations performed for that group of patients.

Based on previous studies [17]-[20], we considered the following lesions as significant findings: Colitis examination, a pre-malignant or malignant lesion, inflammatory bowel disease (IBD) (either newly diagnosed, or with a more accurate diagnosis or determination of disease extent that influenced immediate disease management), angiodysplasia, stenosis (benign or malignant), other colitis (infectious, ischemic, eosinophilic, microscopic) and diverticulosis (as a definite or presumed cause of acute hemetochezia) [21].

Findings considered non-significant were: normal colonoscopy, hemorrhoids, anal fissures, uncomplicated colonic diverticulosis, non-adenomatous polyp, previously established IBD.

Chi-square was used to compare proportions. Multiple logistic regression analysis was performed to investigate parameters (age, gender, indication for colonoscopy) independently related to the diagnostic yield of colonoscopy. $P < 0.05$ was considered statistically significant. Data was analyzed using R, version 4.4.0.

3. Results

A total of 176 patients underwent colonoscopy during the study period. Twenty

of them were excluded because their examination was incomplete for technical reasons. All examinations were ordered by gastroenterologists.

The mean age of the 156 patients included in the study was 56.2 +/− 15.4 years, with extremes of 21 and 99 years.

There were 80 men (51.3%) and 76 women (48.7%), giving a sex ratio of 1.05.

Their distribution by age group and sex is shown in Table 1.

Table 1. Age group and sex distribution of cases.

Age group (year)	Man	Woman	Total	
	n	n	n	%
21 - 29	5	4	9	5.7
30 - 39	9	9	18	11.5
40 - 49	9	13	22	14.1
50 - 59	15	19	34	21.8
60 - 69	24	15	39	25
70 - 79	16	13	29	18.6
80 - 89	2	2	4	2.6
90 - 99	0	1	1	0.6
Total	80	76	156	100

3.1. Appropriateness of Colonoscopy

Of the 156 patients in our study, 82 (52.6%) had undergone colonoscopy for a reason considered as generally indicated according to ASGE guidelines or appropriate indication, and 34 (21.8%) for a reason not generally indicated or inappropriate indication. Forty patients (25.6%) had indications not mentioned in the ASGE guidelines.

Hematochezia was the most frequent indication for colonoscopy in the "reasons generally indicated" group, concerning 28 patients (17.9%), followed by clinically significant diarrhea of unknown origin, for 26 patients (16.7%) (see Table 2).

Among the 34 cases (21.8%) with indications considered as "reasons not generally indicated" according to ASGE criteria, chronic abdominal pain was the most frequent indication, found in 24 cases (15.4%) (Table 3).

Other indications not mentioned in the ASGE recommendations were found in 40 cases (25.6%). Constipation (9.6%) and intestinal obstruction (6.4% of cases) were the most frequent (Table 4).

More women underwent colonoscopy for not generally indicated reasons than men (22 women vs. 12 men). For colonoscopies performed for reasons generally indicated, men were in the majority (45 men vs. 37 women). These differences were not statistically significant (p = 0.104). In the three categories of appropriateness of indications, patients aged over 50 were the most numerous. There were 51 of the 82 patients (62.2%) in the "reasons generally indicated" group, 24 of the

34 patients (70.6%) in the "reasons not generally indicated" group and 32 of the 40 patients (80%) in the "reasons not listed" group. The differences in frequencies observed according to age (< or ≥50 years) in these different groups of relevance of indications were not significant either (p = 0.133).

Table 2. Indications for colonoscopy among patients referred for reasons generally indicated according to ASGE guidelines.

Indications	Number (n)	Percentage (%) of total studied
Hematochezia	28	17.9
Melena after exclusion of an upper GI source	19	12.2
Unexplained iron deficiency anemia	6	3.8
Examination to evaluate the entire colon for synchronous cancer or neoplastic polyps in a patient with treatable cancer or neoplastic polyp	2	1.3
Chronic inflammatory bowel disease of colon if more precise diagnosis or determination of the extent of activity will influence immediate management	1	0.6
Clinically significant diarrhea of unexplained origin	26	16.7
Total	82	52.6

Table 3. Indications for colonoscopy among patients referred for reasons generally not indicated according to the 2000 ASGE guidelines.

Indications	Number (n)	Percentage (%) of total studied
Chronic, stable irritable bowel syndrome or chronic abdominal pain	24	15.4
Acute diarrhea	10	6.4
Total	34	21.8

Table 4. Indications for colonoscopy among patients referred for reasons not listed in 2000 ASGE guideline.

Indications	Number (n)	Percentage (%) of total studied
Abdominal mass	5	3.2
Anal pain	1	0.6
Ascitis	1	0.6
Constipation	15	9.6
Deterioration of general condition	1	0.6
Diarrhea alternating with constipation	6	3.8
Intestinal obstruction	10	6.4
Normochromic normocytic anemia	1	0.6
Total	40	25.6

3.2. Endoscopic Findings and Diagnostic Yield

Of the 156 endoscopies studied, 56 showed a significant result, giving an overall diagnostic yield of 35.9%.

In all, 11 cases (7.1%) of colorectal cancer were identified. Other colitides, inflammatory bowel disease and angiodysplasia were found in 22 (14.1%), 12 (7.7%) and 6 (3.8%) patients respectively (Table 5).

Table 5. Clinical findings on colonoscopy by appropriateness of referral.

Findings	Reason generally indicated		Reason not generally indicated		Reason not listed		Total
	n	%	n	%	n	%	n
Normal colonoscopy	21	33.8	23	37.1	18	29.1	62
Hemorrhoids	8	88.9	0	0	1	11.1	9
Uncomplicated diverticulosis	7	41.2	3	17.6	7	41.2	17
Non adenomatous polyp	3	25	3	25	6	50	12
Malignant lesion	7	63.6	2	18.2a	2	18.2b	11
Inflammatory bowel disease	8	66.7	0	0	4	33.4c	12
Angiodysplasia	6	100	0	0	0	0	6
Other colitides	17	77.3	3	13.6d	2	9.1e	22
Diverticulosis as a definite or presumptive cause of hematochezia	5	100	0	0	0	0	5

[a]p > 0.5 compare to generally indicated; [b]P > 0.05 compare to generally indicated. [c]P > 0.5 compare to generally indicated; [d]p > 0.05 compare to generally indicated. [e]P < 0.05 compare to generally indicated.

Table 6. Appropriateness of indication and diagnostic yield of colonoscopy according to patient's characteristics.

Characteristics of patients	Appropriateness of indications			Total	Diagnostic yield (%)
				n	
	Generally indicated n (%)	Generally not indicated n (%)	Not listed n (%)		
All patients	82 (52.6)	34 (21.8)	40 (25.6)	156	35.9
Diagnostic yield (%)	52.4	14.7	20		
Gender					
Male	45 (56.3)	12 (15)	23 (28.7)	80	36.3
Female	37 (48.7)	22 (28.9)	17 (22.4)	76	35.5
Age (years)					
<50	31 (63.3)	10 (20.4)	8 (16.3)	49	34.7
>50	51 (47.7)	24 (22.4)	32 (29.9)	107	36.5

Table 7. Odds ratio and 95% confidence interval for association between selected parameters and diagnostic yield.

Parameters	Diagnostic yield (%)	OR (95% CI)	P
Gender			
Female	35.5	1.0-	
Male	36.3	0.96 (0.50 – 1.86)	>0.5
Age			
<50	34.7	1.0-	
>50	36.5	0.92 (0.45 – 1.88)	>0.5
Appropriateness of indication			
Generally not indicated	14.7	1.0-	
Not listed	20	1.45 (0.42 – 4.93)	>0.5
Generally indicated	52.4	6.39 (2.25 – 18.15)	<0.001

OR: odd ratio; CI: confidence interval.

The percentage of significant results (or diagnostic yield) was 52.4% among those in the reasons generally indicated group, 14.7% among those with an indication considered as reasons not generally indicated, and 20% for patients whose indications were not listed in the ASGE recommendations (**Table 6** and **Table 7**).

Of the 11 cases of colorectal cancer, 7 were in the reasons generally indicated group, 2 in the reasons not generally indicated group and 2 in the unlisted indications group.

4. Discussion

Just over half the patients in our study (54.5%) had undergone colonoscopy for an indication considered appropriate or "reasons generally indicated", according to ASGE guidelines. Similar percentages to ours have been reported by authors in Colombia and Malaysia, at 52.5% and 57.9% respectively [22] [23]. In a study carried out in Nigeria, the percentage of colonoscopies performed for generally indicated reasons was 66%, and in another conducted in Kuwait, the percentage was 63.6% [17] [24].

In the group of patients with reasons generally indicated, hematochezia was the most frequent indication (17.9% of patients). This was also the case in studies carried out in Italy, Kuwait and Malaysia. The frequency of hematochezia in these studies was 30%, 20% and 35.9% respectively [17] [23] [25].

The mean age of our patients (56 years) was similar to that reported in other studies. Ugiagbé *et al.* in Nigeria found a mean age of 55. It was 50.7 years in the work of Elbarsha in Libya and 57 years in that of Bersani in Italy [24]-[26].

This result can be explained by the fact that colonoscopy is more often performed in the over-50 s than in the under-50 s, with a view to ruling out colorectal cancer or looking for a precancerous lesion, as the risk of colorectal cancer is greater in the over-50 s [27] [28].

However, our results showed no association between patient age and the diagnostic yield of colonoscopy. In patients over 50, the diagnostic yield was 36.5%, and in those under 50 it was 34.7%, with no statistically significant difference.

Nor was gender associated with diagnostic yield. The same observations were made in the Ugiagbé study in Nigeria [24]. In his study, there was no significant difference ($p = 0.083$) between diagnostic yield values in the over-50 s (68.9%) and under-50 s (52.9%). The difference in diagnostic yield between men and women was also not significant ($p = 0.816$).

The appropriateness of indications was associated with the diagnostic yield of colonoscopy. Diagnostic yield was higher in patients who had undergone the examination for reasons generally indicated (52.4%) than in those who had undergone it for reasons not generally indicated (14.7%).

The same observation has been made in studies carried out in Europe, Africa, Asia and the USA.

Charles *et al.* found a significant pathological finding in 40% of patients who underwent colonoscopy for an indication considered as generally indicated reason in the ASGE recommendations (1992 version), compared with 22% in those whose indications did not comply with the recommendations [19].

In Sudan, MUDAWI *et al.* found 58.8% of significant pathological findings in those who had undergone the examination for generally indicated reasons and 27.7% in those who had done so for an inappropriate indication [29].

In South Korea, Choon Young Lee found 59.1% diagnostic yield for appropriate indications and 23.2% for inappropriate indications [30].

Similarly, the diagnostic yield was 43% for patients in the "reasons generally indicated" group and 16% for those in the "reasons not generally indicated" group in the work by Morini *et al.* [18].

In a Swiss study, based on the Swiss Rand Corporation/University of California at Los Angeles (RAND/UCLA) panel criteria, Den Bosset *et al.* found a diagnostic yield of 26% for patients with a recommended indication for colonoscopy and 17% for those with a non-recommended or inappropriate indication [20].

These results show that it is possible for physicians requesting a colonoscopy to determine to some extent in advance whether the result of the examination will be significant or not, based on the indications for the examination, and whether these can be clearly classified as "generally indicated" or "generally not indicated".

However, it is not always possible to classify all situations that might justify a colonoscopy into the categories set out in the ASGE recommendations.

Thus, 25.6% of the patients in our study had undergone colonoscopy for an indication not listed in the ASGE guidelines. Variable percentages of this category of patients have been reported by several authors. In Ugiagbé's work in Nigeria, these patients represented 31.5% of the study population. Their proportion was 16% in Siddique's study in Kuwait, 29.2% in CHAN's study in Malaysia and 5% in Suriani's study in Italy [17] [23] [24] [31].

Constipation was the most frequent indication not listed in the ASGE guide-

lines, affecting 15 of the 40 patients in this group. This was also the case in three of the 4 studies cited above [17] [23] [31]. In Ugiagbe's Nigerian study, it was the second most frequent indication [24].

The diagnostic yield in this group of patients was 20%, higher than that of the "reasons not generally indicated" group, which was 14.7%. Of the 11 cases of cancer found in all the patients studied, 2 were in this group, as many as in the "reasons not generally indicated" group. And 4 of the 12 patients diagnosed with chronic inflammatory bowel disease were in the "reasons not listed" group, while none were in the "reasons not generally indicated" group. In Ugiagbé's work in Nigeria, of 54 cases of cancer diagnosed during colonoscopy, 16 were in the "reasons not listed" group, while none were in the "reasons not generally indicated" group [24]. Siddique's work in Kuwait makes a similar observation [17]. Three cases of colorectal cancer were reported in the "reasons not listed" group, compared with none in the "reasons not generally indicated" group.

These results underline the importance of clinical considerations in the decision to perform colonoscopy when recommendations are non-existent or deficient, or when there is doubt about the indications of the recommendations.

Our study had a number of limitations. It was a retrospective study. As a result, some data not reported in the patients' medical records could not be analyzed. This was the case for patient income. This data could have enabled us to determine whether or not the cost of colonoscopy was an obstacle to its performance in our patients, and whether it could have influenced patient numbers in the three different indication groups, *i.e.* "reason generally indicated", "reason not generally indicated" and "reason not listed".

All the patients included in the study were hospitalized, which could have constituted a selection bias when assessing the diagnostic yield of colonoscopy according to indication, since hospitalized patients generally have severe disease and are therefore more likely to have a significant lesion at colonoscopy than non-hospitalized patients.

All colonoscopies were prescribed by gastroenterologists. Consequently, the conclusions of our study on the relevance of colonoscopy indications cannot be extrapolated to physicians from other specialties practicing at the University Hospital Center of Brazzavile, such as digestive surgeons or infectiologists.

5. Conclusion

Our work showed that just over half of all colonoscopies were performed for indications considered appropriate according to ASGE recommendations. The diagnostic yield was greater for colonoscopies whose indications were considered as appropriate. However, significant findings were also found in some examinations performed for indications not listed in ASGE guidelines, though in smaller proportions. These facts underline the importance of taking recommendations into account, without neglecting clinical reasoning, when deciding whether or not to prescribe colonoscopy to patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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