Scientific Research Publishing

Open Journal of Gastroenterology, 2026, 16(5), 169-180
https://www.scirp.org/journal/ojgas
ISSN Online: 2163-9469
ISSN Print: 2163-9450

Quality Criteria for Colonoscopy in Sub-Saharan Africa: Results from Two Gastrointestinal Endoscopy Centers in Dakar

Marième Polèle Fall[1,2*], Salamata Diallo[1,2], Meïssa Dieng[1], Mamadou Ngoné Gueye[2,3], Alioune Badara Fall[1], Coumba Kouba Cissé[1], Marie Louise Bassène[1,2]

[1]Department of Gastroenterology and Hepatology, Aristide Le Dantec Hospital, Dakar, Senegal
[2]Faculty of Medicine, Pharmacy and Odontostomatology, Cheikh Anta Diop University, Dakar, Senegal
[3]Department of Gastroenterology and Hepatology, General Hospital Idrrisa Pouye, Dakar, Senegal
Email: *polelefall@yahoo.fr, oldou@hotmail.fr, diengmeissa97@gmail.com, mamadoungone@yahoo.fr, alioune1994a@gmail.com, coumbakouba@yahoo.fr

How to cite this paper: Fall, M.P., Diallo, S., Dieng, M., Gueye, M.N., Fall, A.B., Cissé, C.K. and Bassène, M.L. (2026) Quality Criteria for Colonoscopy in Sub-Saharan Africa: Results from Two Gastrointestinal Endoscopy Centers in Dakar. *Open Journal of Gastroenterology*, **16**, 169-180.
https://doi.org/10.4236/ojgas.2026.165018

Received: April 5, 2026
Accepted: May 12, 2026
Published: May 15, 2026

Abstract

Introduction: Colonoscopy is the reference standard for colonic evaluation and the prevention of colorectal cancer. Its diagnostic performance and safety depend on adherence to validated quality indicators. Our objective was to assess colonoscopy quality criteria in two reference endoscopy centers in Dakar. **Patients and Methods:** This was a multicenter, retrospective, descriptive, and analytical study conducted between April 1, 2021, and July 31, 2022. All patients who underwent colonoscopy with an interpretable report were included. We collected sociodemographic data, indications for the examination, colon preparation methods and quality, operator level, examination tolerance, colonoscopy findings, histopathological data on lesions, and the endoscopic treatment performed. Data entry was performed using Excel software, and statistical analysis was conducted using STATA software. **Results:** All patients underwent a pre-colonoscopy consultation, and 75.9% of indications were deemed appropriate according to the 2012 ASGE criteria. All patients received bowel preparation with polyethylene glycol 4 L in split dosing. Adequate preparation, defined as a Boston score ≥ 6, was achieved in 94.4% of colonoscopies. The overall cecal intubation rate was 86.5% and reached 92.1% after excluding impassable tumoral strictures. The polyp detection rate was 18.3% in the overall population and 24.2% among patients aged 50 years and older. Polypectomy was performed in 44.4% of detected polyps, with a retrieval rate of 95%. **Conclusion:** Several major indicators of colonoscopy quality met international standards. However, improved documentation of quality indicators, histological data, and examination conditions remains necessary to optimize the overall quality of

colonoscopy.

Keywords

Colonoscopy, Quality Criteria, Boston Score, Cecal Intubation Rate, Polyp Detection Rate

1. Introduction

Because of its diagnostic and therapeutic capabilities, colonoscopy is the reference examination for investigating diseases of the colon and rectum. Its central role in detecting and resecting precancerous lesions makes it a major public health tool. It has demonstrated efficacy in reducing the incidence and mortality of colorectal cancer [1]. However, its effectiveness depends on the patient's characteristics, the pathology being investigated, the technical conditions under which it is performed, and the operator's experience and rigor.

To harmonize practices and improve examination performance, professional societies such as the American Society for Gastrointestinal Endoscopy (ASGE) and the European Society of Gastrointestinal Endoscopy (ESGE) have defined several quality criteria intended to assess and optimize colonoscopy practice [2] [3]. The systematic and regular assessment of these indicators is a cornerstone of quality assurance in gastrointestinal endoscopy and a recognized marker of the performance of endoscopy units.

In resource-limited countries, particularly in Senegal, colonoscopy practice is expanding rapidly, driven by the training of numerous gastroenterologists and the growth of technical facilities. In this context, an analysis of local practices is essential to assess adherence to international standards and to identify strengths, shortcomings, and areas for improvement suited to real-world conditions. With this aim, we conducted this study to evaluate colonoscopy quality indicators in two university hospitals in Dakar: Aristide Le Dantec Hospital and Idrissa Pouye General Hospital.

2. Patients and Methods

We conducted a retrospective, descriptive, multicenter study over a 16-month period from April 1, 2021 to July 31, 2022. It was carried out in the digestive endoscopy units of the Aristide Le Dantec Hospital and the Idrissa POUYE General Hospital in Grand Yoff.

The study population consisted of all patients who underwent colonoscopy during the study period. We included all patients whose endoscopy reports were available and interpretable. When a given patient underwent multiple colonoscopies during the study period, only the first was retained for analysis.

Patients with unusable reports due to missing data essential for analysis, including age, sex, indication, or endoscopic findings, as well as colonoscopies

prematurely discontinued because of patient refusal or technical failure, were excluded. For other variables, when information was not documented in the report, it was considered missing; the patient remained included in the overall analysis but was excluded only from the calculation of the corresponding indicator.

Data were extracted from colonoscopy reports using a standardized data collection form. Collected variables included sociodemographic characteristics, examination indications, bowel preparation modality and quality, operator level, procedure tolerance, endoscopic findings, histopathological data of lesions, and endoscopic therapy performed.

Quality indicators were calculated in accordance with the definitions recommended by the ASGE and ESGE [2] [3]. When these definitions could not be strictly applied to the available data, operational definitions tailored to our study were used and specified for each indicator.

- The quality of bowel preparation was assessed using the Boston Bowel Preparation Scale (BBPS). This score separately evaluates the cleanliness of the right colon, transverse colon, and left colon, each rated from 0 to 3, yielding a total score ranging from 0 to 9. Preparation was considered adequate for a total score ≥ 6 after a complete colonoscopy, in accordance with the recommendations of the ESGE [3]. The adequate bowel preparation rate corresponded to the proportion of colonoscopies with preparation deemed adequate among complete colonoscopies for which this score was documented.
- The appropriateness of the indication for colonoscopy was assessed in accordance with the 2012 ASGE recommendations [4]. For each procedure, the primary indication was analyzed and classified as appropriate or inappropriate. Colonoscopies with indications that were insufficiently documented to allow classification according to ASGE criteria were excluded from the appropriateness analysis.
- The cecal intubation rate was defined as the proportion of colonoscopies in which cecal intubation was documented in the report. It was calculated overall across all colonoscopies performed, and then after excluding colonoscopies interrupted because of an impassable colonic stricture.
- The Polyp Detection Rate (PDR) was defined as the proportion of colonoscopies in which at least one polyp was identified. It was calculated in the overall population and among patients aged 50 years and older.
- The Adenoma Detection Rate (ADR) was defined as the proportion of colonoscopies in which at least one adenoma was identified endoscopically and confirmed by histological examination, first in the overall population and then among patients aged 50 years and older.
- The appropriateness of the polypectomy technique was assessed for polyps ≥ 3 mm, considering the use of a technique recommended for the lesion size according to the ESGE and the ASGE as compliant.
- In our study, the morphological description of polyps was considered adequate

whenever the Paris and/or NICE classification was used.

- In our study, the polyp retrieval rate was calculated across all resected polyps and defined as the number of polyps retrieved relative to the number of polyps resected.

The quality indicators and their calculation methods are detailed in Table 1.

Table 1. Calculation of colonoscopy quality indicators.

Quality indicators	Numerator	Denominator	Exclusion
Adequate bowel preparation rate	Number of complete colonoscopies with a Boston score ≥ 6	Number of complete colonoscopies with a documented Boston score	Emergency colonoscopies
Appropriateness of the indication for colonoscopy	Colonoscopies with indications appropriate according to the ASGE	Colonoscopies with an indication assessable according to the ASGE	Colonoscopy with an indication that cannot be classified according to the ASGE
Cecal intubation rate global	Number of colonoscopies with documented cecal intubation	Total number of colonoscopies performed	Emergency colonoscopies Treatment without indication reaches the cecum.
Adjusted caecal intubation rate	Number of colonoscopies with documented cecal intubation	Total number of colonoscopies performed, excluding colonoscopies discontinued due to an impassable colonic stricture	Emergency colonoscopies Treatment without specified indication reached the cecum.
TDP* general population	Number of colonoscopies with at least one polyp detected	Total number of colonoscopies performed	Emergency colonoscopies Monitoring MICI activity Processing
TDP patients aged 50 years and older	Number of colonoscopies with at least one polyp detected among patients aged 50 years and older	Total number of colonoscopies performed in patients aged 50 years and older	Emergency colonoscopies Monitoring of MICI activity Processing
TDA general population**	Number of colonoscopies with at least one confirmed adenoma	Total number of colonoscopies performed	Emergency colonoscopies Monitoring of MICI activity Processing
Technical adequacy of polypectomy	Number of polyps ≥ 3 mm resected using a technique consistent with the recommendations	Total number of resected polyps ≥ 3 mm	Polyp < 3 mm
Polyp detection rate	Number of polyps retrieved	Number of polyps resected	None

*TDP: polyp detection rate, **TDA: adenoma detection rate.

The selected indicators were then grouped according to the ESGE classification into major and minor criteria. This subdivision was used for the concise presentation of the results and their comparison with the recommended targets.

Senior practitioners included professors, senior lecturers, chief residents, and attending physicians, whereas junior practitioners corresponded to physicians in specialty training.

Data entry was performed using Excel software, and statistical analyses were conducted using STATA software. Qualitative variables were expressed as counts and percentages. Quantitative variables were reported as means ± standard deviation, median, and extreme values.

3. Results

During the study period, 525 colonoscopies were performed in 525 patients. No patients were excluded. The mean age was 53.6 years [15 - 90 years], with a median of 55 years and a standard deviation of 16.38 years. Patients aged 50 years and older accounted for 64.5% of the total sample. There were 280 men (53.3%). The sex ratio was 1.1.

Colonoscopy was performed for diagnostic purposes in 92.7% of cases, primarily for bowel habit disturbances (53.6%), rectal bleeding (27.7%), and abdominal pain (13.1%). It was performed for surveillance in 4.6% of cases and for screening in 2.7% of cases. One colonoscopy was performed on an emergency basis for massive rectal bleeding.

A pre-endoscopic consultation was conducted for all patients. In all cases, it was carried out by an endoscopy assistant. During this consultation, the patient was informed about the bowel preparation protocol, including a low-residue diet during the three days preceding the examination, as well as the instructions for ingesting Polyethylene Glycol (PEG).

According to ASGE criteria, the indication for colonoscopy was assessable in 490 cases (93.3%) and not assessable in 35 cases (6.7%) due to insufficient clinical information. Among the assessable indications, 372 (75.9%) were appropriate and 118 (24.1%) were inappropriate.

Bowel preparation consisted of 4 liters of Polyethylene Glycol (PEG) in all patients. A dihydrogen phosphate enema was added to two patients. The bowel preparation protocol used for all patients was a divided-dose, or "split-dosing", regimen. The interval between the last PEG dose and the colonoscopy was not specified in any report.

Nearly all colonoscopies were performed without anesthesia (99.8%). They were conducted by a senior physician in 55.4% of cases and by a junior physician in 44.6% of cases.

Bowel preparation quality was assessed using the Boston Bowel Preparation Scale in 471 patients (89.7%) and qualitatively in 28 patients (5.3%). Among complete colonoscopies with a documented Boston score (n = 448), adequate bowel preparation (Boston score ≥ 6) was observed in 94.4% of patients (423/448).

Neither the time allocated to colonoscopy nor the endoscope withdrawal time was reported in any procedure report, precluding their evaluation.

Digital rectal examination systematically preceded the endoscopic procedure. The cecal pole was reached in 453 patients, corresponding to an overall cecal intubation rate of 86.5% (453/524). In 71 patients (13.5%), the cecum could not be reached. The reasons for failure were as follows: tumoral stenosis (32/71: 45.1%), inadequate bowel preparation (16/71: 22.5%), poor tolerance (15/71: 21.1%), failure to advance (6/71: 8.5%), and perforation risk related to lesion severity (2/71: 2.8%). After excluding colonoscopies interrupted because of impassable colonic stenosis, the cecal intubation rate was 92.1% (453/492). The terminal ileum was intubated in 12.2% of cases (64/525). Examination

completeness was reported in the endoscopy reports. No report included images of the cecal pole, the observed lesions, or the quality of bowel preparation.

One or more polyps were identified in 96 patients, corresponding to a Polyp Detection Rate (PDR) of 18.3% in the general population. Among patients aged 50 years and older, the PDR was 24.2%.

Of the 135 identified polyps, size was specified in 90.4% of cases. They were classified according to the Paris and/or NICE classification in 35.5% of cases (48/135). The Paris classification was used in 31.1% (42/135), and the NICE classification in 25.9% (35/135).

Complete polypectomy was performed in 44.4% of cases (60/135). Among polyps measuring ≥ 3 mm (n = 108), polypectomy was performed in 42.6% of cases (46/108). Resection was carried out using a cold snare in 34.8% of cases (16/46) and cold forceps in 65.2% (30/46). The rate of technical adequacy of polypectomy was 34.8%. The retrieval rate of resected polyps was 95% (57/60). No tattooing of the polypectomy site was reported.

The adenoma detection rate could not be determined because most histopathological results were unavailable. Among the 27 available results, 19 adenomas were identified.

No early complications (perforation, post-polypectomy bleeding, or vasovagal symptoms) were reported before discharge from the endoscopy unit. Procedure tolerability, as assessed by the endoscopist, was rated as good in 49.7% of cases, fair in 36.4%, and poor in 13.9%. Patient-reported experience (pain, anxiety, comfort) was not mentioned in any report. Post-colonoscopy surveillance recommendations, including the timing of endoscopic follow-up, were absent from all reports analyzed.

The evaluation of colonoscopy quality indicators according to ESGE standards is presented in Table 2.

Table 2. Evaluation of colonoscopy quality criteria according to the ESGE.

Type of indicator	Recommended threshold	Our study
Key indicators		
Rate of adequate bowel preparation	≥90% of complete colonoscopies	94.4% of complete colonoscopies
Cecal intubation rate	≥90%	92.1%
Adenoma detection rate in patients aged 50 years and older	≥25%	Not evaluable
Technical adequacy of polypectomy	≥80%	34.8%
Complication rate	7-day readmission: ≤0.5% Immediate complications and 30-day mortality: no standard	No early complications were reported.
Patient-reported outcomes (pain/comfort/anxiety scales)	Minimum: unknown Target: ≥90%	Undocumented
Appropriate surveillance after polypectomy	Minimum: unknown Target: ≥90%	Undocumented

Continued

Minor indicators		
Time allocated for colonoscopy	Thirty minutes for diagnostic and screening colonoscopies (45 minutes if FIT-positive)	Undocumented
Appropriateness of the indication according to the ASGE	≥85%	75.9%
Endoscope withdrawal time	≥6 minutes (excluding therapeutic interventions)	Undocumented
Polyp detection rate in patients aged 50 years and older	≥40%	24.2%
Resection site tattooing	Recommended for lesions ≥20 mm or at risk	Undocumented

4. Discussion

In our study, a pre-colonoscopy consultation was performed in all patients, in accordance with international guidelines [5]. It was systematically conducted by an endoscopy assistant. In the study by Delsa *et al.* [6], this consultation was conducted by a physician in 78% of cases and by a nurse or pharmacist in 13.7% of cases. This step is recognized by the ASGE and the ESGE as pivotal [2] [3]. Ideally, it should be conducted by a physician or failing that, under physician supervision. In our setting, having it performed by an endoscopy assistant constitutes an organizational limitation. This consultation enables the provision of informed information to the patient regarding the benefits, risks, and practical aspects of colonoscopy; the collection of consent; the tailoring of bowel preparation; the planning of anticoagulant and antiplatelet management; and the confirmation of the indication for the examination.

The appropriateness of indications partly determines the diagnostic yield of the examination and ensures appropriate use of endoscopic resources, particularly in resource-limited settings. In our study, 75.9% of indications were considered appropriate according to the 2012 ASGE criteria [4], a rate higher than that reported by Assi (40%) [7] and Ugiagbe (66%) [8] but lower than that observed by Brenu (79%) [9] and Gudissa (95.1%) [10]. Inter-study differences are explained by the reference standards used (ASGE versus *European Panel on the Appropriateness of Gastrointestinal Endoscopy*: EPAGE) and by changes in recommendations (more recent versions, notably ASGE 2012, covering a broader spectrum than earlier versions). Moreover, the high rates observed in Africa may also reflect restricted access to colonoscopy, focusing the examination on symptomatic patients with alarm features rather than strict adherence to guidelines.

The quality of bowel preparation is a major determinant of colonoscopy performance. According to the ESGE, it directly determines two key indicators: ADR and the cecal intubation rate. It also influences the safety, duration, and diagnostic cost-effectiveness of the examination [11]. All patients in our series received preparation based on 4-L PEG administered as split-dosing. This strategy is currently considered the optimal modality because of its demonstrated superiority in terms of efficacy, tolerability, adherence, and safety, as well as its favorable impact on

colonoscopy performance indicators [3] [12]. The interval between the last PEG dose and the examination, a factor that directly influences preparation quality, could not be analyzed because it was not documented. The ESGE recommends an interval of <4 hours to optimize colonic visibility and diagnostic yield [3]. Systematic inclusion of this information in endoscopy reports is recommended. Assessment of bowel preparation was predominantly standardized. The Boston score, the most extensively validated score, was used in 89.7% of our patients. Adequate preparation was observed in 94.4% of complete colonoscopies. This result is higher than those reported in several African series. Indeed, Dramane [13] reported 80% adequate preparation, whereas Delsa [6] and Gudisa [10] reported a Boston score ≥7 in 43.6% and 71.6%, respectively. It was comparable to data from European surveys, such as the ESGE Quality Survey 2021 [14] (84.2% for Boston ≥6) and the French SFED 2017 survey (83.7% for Boston ≥7) [15]. It was consistent with the recommended minimum threshold (≥90%) and close to the optimal target of 95% set by the ASGE and ESGE [2] [3].

The quality of bowel preparation determines mucosal visibility and the advancement of the endoscope. Consequently, it is closely associated with the caecal intubation rate which is a major indicator of colonoscopy quality. In our study, the overall caecal intubation rate was 86.3%, comparable to that reported by Assi *et al.* in Côte d'Ivoire [16] (86%). By contrast, lower rates were reported by Brenu *et al.* in Ghana [9] (81.8 %) and Delsa *et al.* in Morocco [6] (85%). Akere *et al.* in Nigeria [17] and Dramane *et al.* in Côte d'Ivoire [13] reported higher rates of 89.2% and 99.3%, respectively. After excluding colonoscopies interrupted due to an impassable stricture, the adjusted caecal intubation rate reached 92.3%, thereby exceeding the targets set by the ASGE and ESGE, which recommend a rate ≥ 90% in patients with adequate bowel preparation in the absence of stenosing lesions [2] [3].

In our study, none of the reports included images of the cecal base, lesions, or bowel preparation. This lack of iconography has been reported in most African studies [6] [9] [16] [18] [19]. It may be explained by the limited availability of modern equipment, as well as the absence of standardized computerized medical records. However, it represents a limitation in studies assessing colonoscopy quality in Africa. The photographic documentation is recommended to certify completeness, preparation quality, lesion characterization, and therapeutic relevance [2] [3].

In our study, the Polyp Detection Rate (PDR) was 18.3% in the overall population, a result comparable to those reported in several African series, where it ranged from 12.8% to 18.1% [6] [13] [20]. Among patients aged 50 years and older, it reached 24.2%, but remained markedly lower than European data, where the PDR in this age group is approximately 40% [14], a value close to the minimum threshold recommended by the ESGE (≥40%) for this population [3]. PDR is a simple and readily available indicator because it can be extracted directly from endoscopy reports and does not systematically depend on the availability of his-

tological results. However, it remains less robust than the adenoma detection rate, because it includes both neoplastic and non-neoplastic polyps. In resource-limited settings, where access to histopathology data is often limited, its use instead of ADR could be considered.

Polyps were characterized according to the Paris and/or NICE classification in 35.5% of cases. The Paris classification was used in 31.1% of cases and the NICE classification in 25.9% of cases. In published African series, standardized morphological classification of polyps is rarely documented, with reports most often limited to a non-standardized description [16] [19] [21]. This is a central element of report quality. The ESGE recommends use of the Paris classification, particularly to avoid missing flat and depressed lesions, which carry a higher risk of submucosal invasion [3]. In North America, ASGE and US Multi-Society Task Force recommendations emphasize the value of optical classifications such as NICE, particularly in the context of optical diagnosis [2] [22]. In Asia, particularly in Japan, greater emphasis is placed on advanced endoscopic lesion characterization, with frequent use of dedicated optical classifications.

The technical adequacy rate was 34.8%, well below the target set by the ESGE (≥80%). However, polyp retrieval was high (95%), suggesting good mastery of the maneuvers performed. Published African data on polypectomy remain scarce [16] [19] [20]. According to the ESGE, cold forceps may be considered as a second-line option for polyps ≤ 3 mm when cold snare polypectomy is technically difficult, whereas the US Multi-Society Task Force limits its use to 1 - 2 mm lesions in the same situation. In both guidelines, cold snare polypectomy remains the reference technique for sessile polyps < 10 mm, particularly those measuring 4 - 9 mm [3] [22]. The predominant use of cold forceps for ≥3 mm polyps mainly reflects disparities in equipment availability, specific training in cold snare polypectomy, and standardization of practices.

The TDA could not be calculated in our study due to the lack of histological results for the majority of resected polyps. In our setting, specimens were delivered to the pathology laboratory by the patients themselves, who were also expected to collect the histology results and return them to the endoscopy unit. As this process was not consistently completed, a substantial proportion of histology results remained unavailable. This is a major limitation, as TDA is the primary indicator of colonoscopy performance and a marker of interval cancer risk. In African series, reported TDA values are generally low (7.7% - 12%) [6] [13] [23], with higher values in certain organized screening settings, such as in Nigeria (28.8 %) [24]. In contrast, Western series most often report TDA values between 25% and 45%, thresholds that have underpinned current recommendations. These differences may be explained by a lower prevalence of colorectal adenomas in Africa, but also by colonoscopies that are more often diagnostic than screening, limited access to advanced technologies, and insufficient histological traceability. Moreover, no study with a sufficient level of evidence exists to establish a TDA threshold in most African countries.

No early complication was reported in our study. Ray-Offor *et al.* [19], in a Nigerian systematic review of 21 studies including 5,821 patients, reported only two cases of post-polypectomy bleeding. In case series from Côte d'Ivoire [16] and Morocco [6], no major complication was reported. However, the lack of assessment of late complications and the predominantly diagnostic nature of the examinations (92.7%), with a low proportion of advanced polypectomies, limit the significance of this observation. Indeed, perforation occurs in 0.016% to 0.1% of cases during diagnostic colonoscopy, whereas post-polypectomy bleeding occurs in 0.2% to 1% of cases [25].

The physician assessed the tolerability of the examination in all cases. However, none of the reports mentioned the patient's perceived experience. The ASGE and the ESGE consider it a major quality indicator for colonoscopy and recommend that it ideally be assessed using a validated scale (Nurse-Assessed Patient Comfort Score (NAPCOMS), Modified Gloucester Comfort Scale) [2] [3]. In Western centers, the use of sedation (midazolam, propofol) and CO_2 insufflation makes it possible to achieve low discomfort rates.

In our study, no post-polypectomy surveillance recommendation was included in the procedure reports, even though this is a key quality indicator. It enables the prevention of adenomatous recurrence and thereby reduces the risk of Colorectal Cancer (CRC) [2] [3] [5]. This finding reflects constraints related to traceability, limited access to pathology services, the lack of patient reminder systems, difficulties with long-term follow-up, and the absence of screening programs.

5. Conclusion

Several major indicators of colonoscopy quality met international standards, notably the quality of bowel preparation, and the cecal intubation rate. However, shortcomings remain in the conditions under which the procedure is performed, the appropriateness of indications, the documentation of quality indicators, and the availability of histological data. Improvements in these areas are still needed to optimize the overall quality of colonoscopy.

Ethical Considerations

The study was retrospective. It posed no additional risk to patients and did not involve the collection of new paraclinical data. Data were collected in strict compliance with medical confidentiality and kept confidential.

Conflicts of Interest

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

References

[1] Knudsen, M.D., Wang, K., Wang, L., Polychronidis, G., Berstad, P., Hjartåker, A., *et al.* (2025) Colorectal Cancer Incidence and Mortality after Negative Colonoscopy Screening Results. *JAMA Oncology*, **11**, 46-54.

https://doi.org/10.1001/jamaoncol.2024.5227

[2] Rex, D.K., Schoenfeld, P.S., Cohen, J., Pike, I.M., Adler, D.G., Fennerty, M.B., *et al.* (2015) Quality Indicators for Colonoscopy. *Gastrointestinal Endoscopy*, **81**, 31-53. https://doi.org/10.1016/j.gie.2014.07.058

[3] Kaminski, M., Thomas-Gibson, S., Bugajski, M., Bretthauer, M., Rees, C., Dekker, E., *et al.* (2017) Performance Measures for Lower Gastrointestinal Endoscopy: A European Society of Gastrointestinal Endoscopy (ESGE) Quality Improvement Initiative. *Endoscopy*, **49**, 378-397. https://doi.org/10.1055/s-0043-103411

[4] Early, D.S., Ben-Menachem, T., Decker, G.A., Evans, J.A., Fanelli, R.D., Fisher, D.A., *et al.* (2012) Appropriate Use of GI Endoscopy. *Gastrointestinal Endoscopy*, **75**, 1127-1131. https://doi.org/10.1016/j.gie.2012.01.011

[5] Lapuelle, J., Bernardini, D., Robaszkiewicz, M. and Chaussade, S. (2019) Quality Criteria for Colonoscopy-Recommendations of the CNP-HGE and the SFED. *Hépato-Gastro et Oncologie Digestive*, **26**, 15-28.

[6] Delsa, H., Sokpon, M., Salihoun, M., Acharki, M., Serraj, I. and Kabbaj, N. (2022) Evaluation of the Quality of Bowel Preparation Using the BBPS: Experience from a Moroccan Department. *PAMJ Clinical Medicine*, **8**, 1-18.

[7] Assi, C., Lohouès-Kouacou, M.J., Allah-Kouadio, E., Njossu, C.J., Okon, A.J., Doffou, S., *et al.* (2012) Appropriateness of Colonoscopy in Cocody Teaching Hospital Center in 2010: A Prospective Study Using Criteria Established by the European Panel on the Appropriateness of Gastrointestinal Endoscopy (EPAGE). *Open Journal of Gastroenterology*, **2**, 193-199. https://doi.org/10.4236/ojgas.2012.24039

[8] Ugiagbe, R., Omuemu, C. and Imarhiagbe, F. (2016) Appropriateness of Indication and Diagnostic Yield of Colonoscopy in a Southern Nigerian Tertiary Hospital. *British Journal of Medicine and Medical Research*, **14**, 1-8. https://doi.org/10.9734/bjmmr/2016/24675

[9] Brenu, S.G., Agbedinu, K., Yorke, J., Dally, C.K., Adinku, M.O., Micah, E., *et al.* (2025) Enhancing Colonoscopy Services in Ghana: A Comprehensive Assessment of Referral Indications and Endoscopic Findings in a Leading Tertiary Care Hospital. *Journal of West African College of Surgeons*, **16**, 11-17. https://doi.org/10.4103/jwas.jwas_155_24

[10] Gudissa, F.G., Alemu, B., Gebremedhin, S., Gudina, E.K. and Desalegn, H. (2021) Colonoscopy at a Tertiary Teaching Hospital in Ethiopia: A Five-Year Retrospective Review. *PAMJ Clinical Medicine*, **5**, Article 37. https://doi.org/10.11604/pamj-cm.2021.5.37.26398

[11] Hassan, C., East, J., Radaelli, F., Spada, C., Benamouzig, R., Bisschops, R., *et al.* (2019) Bowel Preparation for Colonoscopy: European Society of Gastrointestinal Endoscopy (ESGE) Guideline—Update 2019. *Endoscopy*, **51**, 775-794. https://doi.org/10.1055/a-0959-0505

[12] Enestvedt, B.K., Fennerty, M.B. and Eisen, G.M. (2012) Randomized Clinical Trial: Bowel Preparation for Colonoscopy. A Meta-Analysis. *Alimentary Pharmacology & Therapeutics*, **35**, 744-754.

[13] Dramane, S., Al Vera, V.D.M., Ouattara, A. and Lah Bi, R. (2022) Quality Criteria for Colonoscopy in a Digestive Endoscopy Unit in Abidjan. *Journal of Clinical Gastroenterology and Hepatology*, **6**, 4-8.

[14] Spada, C., Koulaouzidis, A., Hassan, C., Amaro, P., Agrawal, A., Brink, L., *et al.* (2021) Colonoscopy Quality across Europe: A Report of the European Colonoscopy Quality Investigation (ECQI) Group. *Endoscopy International Open*, **9**, E1456-E1462. https://doi.org/10.1055/a-1486-6729

[15] Bernardini, D., Bulois, P., Barthet, M., Chaussade, S., Gronier, O., Lecomte, T., *et al.* (2017) "Une semaine de coloscopie en France": Résultats 2017 de l'enquête annuelle de la Société française d'endoscopie digestive. *Acta Endoscopica*, **47**, 242-251. https://doi.org/10.1007/s10190-017-0613-2

[16] Assi, C., Koné, S., Ouattara, A., Soro, D., Allah-Kouadio, E. and Lohouès-Kouacou, M.J.A. (2017) La coloscopie totale en 2015 dans un hôpital universitaire à Abidjan: Conditions de réalisation et résultats. *Journal Africain d'Hépato-Gastroentérologie*, **11**, 64-67. https://doi.org/10.1007/s12157-017-0702-4

[17] Akere, A. and Akande, K. (2017) Cecal Intubation Rate during Colonoscopy at a Tertiary Hospital in South-West Nigeria: How Frequent and What Affects Completion Rate? *Nigerian Journal of Clinical Practice*, **20**, 303-306. https://doi.org/10.4103/1119-3077.187334

[18] Onyekwere, C.A., Odiagah, J.N., Ogunleye, O.O., Chibututu, C. and Lesi, O.A. (2013) Colonoscopy Practice in Lagos, Nigeria: A Report of an Audit. *Diagnostic and Therapeutic Endoscopy*, **2013**, Article ID: 798651. https://doi.org/10.1155/2013/798651

[19] Ray-Offor, E., Ijah, R.F.O.A. and Egboh, S.C. (2022) Colonoscopy Practice and Polyp Detection in Nigeria: A Systematic Review. *Nigerian Journal of Gastroenterology and Hepatology*, **14**, 11-23. https://doi.org/10.4103/njgh.njgh_8_22

[20] Teshome, H., Redae, B. and Teklesilassie, H. (2020) Experience of Colonoscopy at a Tertiary Hospital, Addis Ababa, Ethiopia. *Ethiopian Medical Journal*, **58**, 49-55.

[21] Fall, M.P., Basséne, M.L., Diallo, S., Gueye, M.N., Cissé, C.A.B., Diop, M.M., *et al.* (2023) Indications and Results of Lower Gastrointestinal Endoscopy in a Regional Hospital Center in Senegal. *Open Journal of Gastroenterology*, **13**, 43-48. https://doi.org/10.4236/ojgas.2023.131005

[22] Kaltenbach, T., Anderson, J.C., Burke, C.A., Dominitz, J.A., Gupta, S., Lieberman, D., *et al.* (2020) Endoscopic Removal of Colorectal Lesions—Recommendations by the US Multi-Society Task Force on Colorectal Cancer. *Gastroenterology*, **158**, 1095-1129. https://doi.org/10.1053/j.gastro.2019.12.018

[23] Kruger, J., Katsidzira, L., Setshedi, M. and Thomson, S.R. (2020) Prevalence and Characteristics of Incidental Colorectal Polyps in Patients Undergoing Colonoscopy at a South African Tertiary Institution. *South African Medical Journal*, **110**, 1191-1194. https://doi.org/10.7196/samj.2020.v110i12.14582

[24] Ray-Offor, E. and Abdulkareem, F.B. (2019) Screening Colonoscopy in Port Harcourt, Nigeria. *Gastroenterology Insights*, **10**, Article 7987. https://doi.org/10.4081/gi.2019.7987

[25] Fisher, D.A., Maple, J.T., Ben-Menachem, T., Cash, B.D., Decker, G.A., Early, D.S., *et al.* (2011) Complications of Colonoscopy. *Gastrointestinal Endoscopy*, **74**, 745-752. https://doi.org/10.1016/j.gie.2011.07.025