Thieme

# Performance measures for colonoscopy in inflammatory bowel disease patients: European Society of Gastrointestinal Endoscopy (ESGE) Quality Improvement Initiative

Authors

**Evelien Dekker[1,*], Karlijn J. Nass[1,*], Marietta Iacucci[2], Alberto Murino[3], João Sabino[4], Marek Bugajski[5,6,7], Cristina Carretero[8], George Cortas[9], Edward J. Despott[3], James E. East[10,11], Michal F. Kaminski[5,6,7], John Gásdal Karstensen[12,13], Martin Keuchel[14], Mark Löwenberg[1], Ashraf Monged[15], Olga M. Nardone[16,17], Helmut Neumann[18], Mahmoud M. Omar[19], Maria Pellisé[20], Laurent Peyrin-Biroulet[21], Matthew D. Rutter[22], Raf Bisschops[4]**

Institutions

1 Department of Gastroenterology and Hepatology, Amsterdam University Medical Centers, Amsterdam, The Netherlands
2 Institute of Immunology and Immunotherapy, NIHR Birmingham Biomedical Research Centre, University Hospitals NHS Foundation Trust, University of Birmingham, Birmingham, UK
3 Royal Free Unit for Endoscopy, The Royal Free Hospital and University College London Institute for Liver and Digestive Health, London, UK
4 Department of Gastroenterology and Hepatology, University Hospital Leuven, TARGID, KU Leuven, Leuven, Belgium
5 Department of Gastroenterology, Hepatology and Oncology, Medical Center for Postgraduate Education, Warsaw, Poland
6 Department of Gastroenterological Oncology, The Maria Sklodowska-Curie Memorial Cancer Center and Institute of Oncology, Warsaw, Poland
7 Department of Health Management and Health Economics, University of Oslo, Oslo, Norway
8 Department of Gastroenterology, University of Navarre Clinic, Healthcare Research Institute of Navarre, Pamplona, Spain
9 University of Balamand Faculty of Medicine, St. George Hospital University Medical Center, Beirut, Lebanon
10 Translational Gastroenterology Unit, Nuffield Department of Medicine, John Radcliffe Hospital, University of Oxford, Oxford, UK
11 Division of Gastroenterology and Hepatology, Mayo Clinic Healthcare, London, UK
12 Gastroenterology Unit, Copenhagen University Hospital – Amager and Hvidovre, Hvidovre, Denmark
13 Department of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark
14 Clinic for Internal Medicine, Agaplesion Bethesda Krankenhaus Bergedorf, Hamburg, Germany
15 Endoscopy Unit, Royal College of Surgeons of Ireland Hospitals Group, Dublin, Ireland
16 Institute of Translational Medicine and Institute of Immunology and Immunotherapy, University of Birmingham, Birmingham, UK
17 Gastroenterology, Department of Clinical Medicine and Surgery, University Federico II of Naples, Naples, Italy
18 Department of Medicine I, University Medical Center Mainz, Mainz, Germany
19 Department of Internal Medicine, Digestive Diseases and Endoscopy, New Mowasat Hospital, Salmiya, Kuwait
20 Gastroenterology Department, Endoscopy Unit, ICMDiM, Hospital Clinic, CIBEREHD, IDIBAPS, University of Barcelona, Catalonia, Spain
21 Department of Gastroenterology, University Hospital of Nancy, Nancy, France
22 Department of Gastroenterology, University Hospital of North Tees, Stockton-on-Tees, Cleveland, UK

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* Equal first authors

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**Corresponding author**
Evelien Dekker, MD PhD, Department of Gastroenterology and Hepatology, Amsterdam University Medical Centers, University of Amsterdam, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands
e.dekker@amsterdamumc.nl

**ABSTRACT**

The European Society of Gastrointestinal Endoscopy (ESGE) presents a short list of performance measures for colonoscopy in inflammatory bowel disease (IBD) patients. Current performance measures for colonoscopy mainly focus on detecting (pre)malignant lesions. However, these performance measures are not relevant for all colonoscopy indications in IBD patients. Therefore, our aim was to provide endoscopy services across Europe and other interested countries with a tool for quality monitoring and improvement in IBD colonoscopy. Eight key performance measures and one minor performance measure were recommended for measurement and evaluation in daily endoscopy practice.

**ABBREVIATIONS**

| | |
|---|---|
| **BBPS** | Boston Bowel Preparation Scale |
| **ESGE** | European Society of Gastrointestinal Endoscopy |
| **GI** | gastrointestinal |
| **GRADE** | Grading of Recommendations Assessment, Development and Evaluation |
| **IBD** | inflammatory bowel disease |
| **MES** | Mayo Endoscopic Score |
| **PICO** | population/patient, intervention/indicator, comparator/control, outcome |
| **SES-CD** | Simple Endoscopic Score for Crohn's Disease |
| **UC** | ulcerative colitis |
| **UCEIS** | Ulcerative Colitis Endoscopic Index of Severity |
| **UEG** | United European Gastroenterology |

## Introduction

The European Society of Gastrointestinal Endoscopy (ESGE) and United European Gastroenterology (UEG) have identified monitoring and evaluation of the quality of endoscopy as a major priority [1]. To this aim, the ESGE and UEG have developed several performance measures for different types and aspects of gastrointestinal (GI) endoscopy over the past few years [2–6]. Current performance measures for colonoscopy have mainly focused on optimal detection of (pre)malignant lesions [4]. However, the detection of (pre)malignant lesions is not the primary aim in colonoscopies performed in patients with a clinical suspicion of inflammatory bowel disease (IBD), nor when assessing endoscopic disease activity in known IBD patients. To date, no endoscopy performance measures have been identified for IBD patients. Furthermore, the current performance measures for colonoscopy do not include surveillance of longstanding IBD patients. Although several recommendations have been published for surveillance colonoscopy in IBD patients [7–9], these recommendations are numerous and not consistently measurable in community endoscopy practices.

The aim of the IBD taskforce within the colonoscopy working group of the ESGE Quality Improvement Committee was to identify performance measures for colonoscopy in IBD patients that are widely applicable to endoscopy services throughout Europe and other interested countries. These performance measures would ideally meet the following criteria: have a proven impact on clinical outcomes; be well-defined, reliable, simple, and user-friendly; provide an opportunity for improvement; and be widely applicable to all levels of endoscopy services.

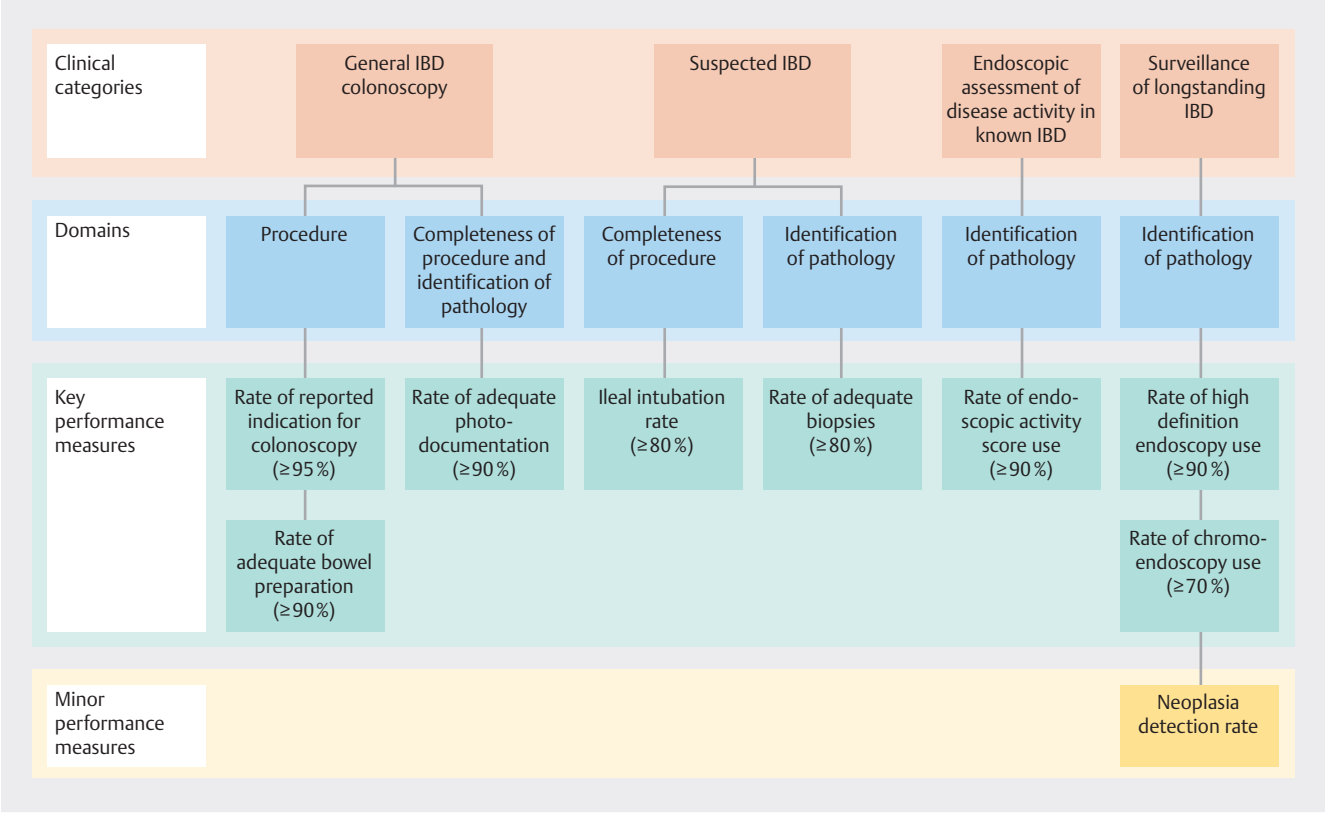
This paper reports the consensus-based list of key performance measures for colonoscopy in IBD patients and describes the methodological process applied in the development of these measures. Performance measures are divided into key performance measures and minor performance measures.

## Methodology

The multistep procedure to develop performance measures has been previously described [1]. In short, a modified Delphi consensus process was used to develop performance measures for colonoscopy in IBD patients. These performance measures were categorized into performance measures for three clinical settings: clinical suspicion of IBD, endoscopic assessment of disease activity in known IBD patients, and surveillance. Clinical suspicion of IBD can be defined as: either a clinical suspicion of IBD prior to colonoscopy (i. e. symptoms of diarrhea, iron deficiency anemia, or raised biomarkers), which may be confirmed by endoscopic signs of inflammation; or the finding of signs suggestive of IBD during a colonoscopy initially performed for a different indication, which then raises the suspicion of IBD. Surveillance colonoscopy is recommended in longstanding IBD patients (8 years after disease onset) [10]. In each clinical category, performance measures were defined for the following three quality domains: preprocedure, completeness of the procedure, and identification of pathology. One or two performance measures were defined per domain.

To identify performance measures for IBD colonoscopy, every working group member was invited to introduce potential performance measures. All of these performance measures




▶ **Fig. 1** The clinical categories, domains, and performance measures chosen by the expert working group for colonoscopy in patients with inflammatory bowel disease (IBD).

were discussed during a first videoconference in March 2021 and prioritized by all working group members (see Supporting information, available online). With this prioritization in mind, subworking groups for each clinical category (clinical suspicion of IBD; endoscopic assessment of disease activity; surveillance) structured the relevant performance measures using the PICO framework (where P stands for Population/Patient, I for Intervention/Indicator, C for Comparator/Control, and O for Outcome) to perform searches for available evidence to support these performance measures.

The clinical statements and performance measures derived from the PICOs were adapted or omitted during iterative rounds of comments and suggestions from the working group members during the Delphi process. This process began with a consensus meeting in June 2021, where the results of the literature searches were presented by each working group. Between July and September 2021, three online voting rounds were organized. After each voting round, a videoconference was scheduled with all working group members to discuss the comments received. A summary of the discussion during these videoconferences was added as supporting text to the next round of the Delphi process. The results of the iterative rounds of the Delphi process can be reviewed in the Supporting information.

In total, working group members participated in three voting rounds to agree on, or rescind, the definitions of statements and performance measures. A statement was accepted if at least 80 % agreement was reached after a minimum of two voting rounds. Statements not reaching agreement were extensively discussed during the online meetings based on the comments made during the previous voting round. This discussion led to modified statements that were tested in a subsequent voting round. Statements were discarded if agreement was not reached (< 80 %) after three voting rounds. The agreement given for the different statements in this paper refers to the last voting round in the Delphi process.

The performance measures are shown below the relevant clinical category and quality domain. Each box describes a different performance measure, the level of agreement during the modified Delphi process, and the grading of the available evidence, which was determined according to the Grading of Recommendations Assessment, Development and Evaluation [GRADE] system [11]. Instructions on how these performance measures should be measured and calculated, including standards for evaluation, are listed in each box.

The minimum number needed to assess whether the threshold for a certain performance measure has been reached can be calculated by estimating the 95 % CIs around the predefined threshold for different sample sizes. For practical reasons and to simplify implementation and auditing, the working group suggests that at least 100 consecutive procedures (or all, if < 100 have been performed) should be measured to assess a performance measure. Ideally, continuous monitor-

ing of performance should be integrated as part of regular performance management.

All performance measures should be assessed at an individual level; however, in situations where this is not feasible, an assessment of performance measures should at least be applied at service level.

## Performance measures for colonoscopy in IBD patients

The input from the working group members and the evidence derived from the literature search resulted in a total of 16 statements and 11 potential performance measures that were considered relevant for IBD colonoscopies (see Supporting information). The working group members considered several other performance measures, such as measures on patient tolerance, sedation, standard terminology, and complications; however, the working group members agreed that these performance measures were not essential to assure high quality colonoscopy explicitly for IBD patients. Therefore, general colonoscopy recommendations and standards for these measures should be considered for IBD colonoscopy [4].

The statements and performance measures were categorized into three clinical categories and six domains. To minimize overlap between the different categories, some statements and potential performance measures were combined into a "general IBD colonoscopy" category after the first voting round. After three voting rounds, a total of 15 statements, eight key performance measures, and one minor performance measure were accepted (▶ **Fig. 1**). The process of the development of these statements and performance measures can be reviewed in the Supporting information. The performance measures are presented below using the descriptive framework proposed by the Quality Improvement Committee and a short summary of the available literature [1]. The performance measures are listed according to the clinical categories and domains to which they were attributed.

### 1 General IBD colonoscopy: preprocedure

| Key performance measure | Rate of reported indication for colonoscopy |
|---|---|
| Description | Percentage of colonoscopies explicitly including the indication for the procedure |
| Clinical category | General IBD colonoscopy |
| Domain | Preprocedure |
| Category | Process |
| Rationale | Colonoscopies with an appropriate indication are associated with higher diagnostic yield for relevant lesions than colonoscopies without an appropriate indication |
| Construct | **Denominator**: All colonoscopies performed in IBD patients<br>**Numerator**: Procedures in the denominator that explicitly include the indication in the endoscopy report |
| Standards | Minimum standard: ≥ 95 %<br>Target standard: ≥ 98 % |
| Consensus agreement | 100 % |
| PICO | 1.5 and 2.3 (see Supporting information) |
| Evidence grading | Moderate |

The acceptance of this performance measure is based on agreement with the following statement:

- For colonoscopies performed in IBD patients, the endoscopy report should explicitly include the indication for the procedure: i. e. clinical suspicion of IBD, endoscopic assessment of disease activity, or surveillance. Agreement: 100 %

Inappropriate referral for colonoscopy might lead to the misuse of limited endoscopic resources, an increase in potential harm to patients from unnecessary invasive procedures, and an increase in healthcare costs. In general, colonoscopies with an appropriate indication are associated with significantly higher diagnostic yields for relevant lesions than colonoscopies without an appropriate indication [4]. There is also literature that supports these findings specifically for IBD colonoscopies. The diagnostic yield for IBD-related lesions is significantly higher in colonoscopies with an appropriate indication compared with colonoscopies without an appropriate indication [12, 13]. The proposed minimum standard rate for reporting of the indication for colonoscopy (≥ 95 %) was set because this is a prerequisite for the monitoring and evaluation of explicit performance measures in each clinical category for IBD patients.

| Key performance measure | Rate of adequate bowel preparation |
|---|---|
| Description | The percentage of patients with an adequately prepared bowel |
| Clinical category | General IBD colonoscopy |
| Domain | Preprocedure |
| Category | Process |
| Rationale | The quality of bowel preparation affects the efficacy of colonoscopy |
| Construct | **Denominator**: All colonoscopies performed in IBD patients<br>**Numerator**: Patients in the denominator with adequate bowel preparation (assessed with a validated scale) |
| Standards | Minimum standard: ≥ 90 %<br>Target standard: none set |
| Consensus agreement | 95 % |
| PICO | 1.6, 2.4, and 3.1 (see Supporting information) |
| Evidence grading | Moderate |

The acceptance of this performance measure is based on agreement with the following statements:

- For colonoscopies performed in IBD patients, the endoscopy report should include the adequacy of bowel preparation using a validated score. Agreement: 100 %
- Adequate bowel preparation should be obtained in 90 % of the colonoscopies performed in IBD patients. Agreement: 95 %

Inadequate bowel preparation has a detrimental effect on all quality aspects of colonoscopy [14]. Adequate bowel preparation in IBD patients is essential for disease assessment and for the detection of dysplasia during colonoscopy [14]. A successful surveillance colonoscopy requires adequate bowel preparation to detect any nonpolypoid flat lesions hidden by debris and stool [15]. A recent study has shown that inadequate bowel preparation and active colonic inflammation were the most frequent factors resulting in unsuccessful chromoendoscopy in surveillance colonoscopies in IBD patients [16].

The quality of bowel preparation should be assessed with a validated scale, as has also been recommended by the ESGE for general colonoscopy [4]. Three scales have been comprehensively validated: the Boston Bowel Preparation Scale (BBPS), the Ottawa Scale, and the Aronchick Scale. Adequate bowel preparation may be defined as: BBPS ≥ 6; Ottawa Scale ≤ 7; or Aronchick Scale excellent, good, or fair [4].

The proposed minimum standard of adequate bowel preparation for colonoscopy in IBD patients (≥ 90 %) was adopted from the ESGE guideline on performance measures for lower GI endoscopy [4], as no evidence was found to support adjusted standards for the subpopulation of IBD patients. Few data explored an association between IBD disease activity and the quality of bowel preparation. Hence, there is no definitive proof that patients with IBD have an increased likelihood of inadequate bowel preparation. In a retrospective analysis of 348 colonoscopies from 169 consecutively enrolled IBD patients, no differences were found in the quality of bowel preparation between patients with active disease and those with mucosal healing, suggesting that the efficacy of bowel preparation is not influenced by disease inflammation [17].

## 2 General IBD colonoscopy: completeness of procedure and identification of pathology

| Key performance measure | Rate of adequate photodocumentation |
|---|---|
| Description | The percentage of patients with adequate photodocumentation |
| Clinical category | General IBD colonoscopy |
| Domain | Completeness of procedure and identification of pathology |
| Category | Process |
| Rationale | It is recommended that adequate photodocumentation be included in the endoscopy report to enable quality control |
| Construct | **Denominator**: All colonoscopies performed in patients with endoscopic suspicion of IBD, for endoscopic assessment of disease activity in IBD patients, and for surveillance colonoscopies in longstanding IBD patients<br>**Numerator**: Procedures in the denominator with adequate photodocumentation |
| Standards | Minimum standard: ≥ 90 %<br>Target standard: ≥ 95 % |
| Consensus agreement | 100 % |
| PICO | 1.3 and 2.7 (see Supporting information) |
| Evidence grading | Very low |

The acceptance of this performance measure is based on agreement with the following statements:

- When colonoscopies are performed because of endoscopic suspicion of IBD or for endoscopic assessment of disease activity in IBD patients, at least one image should be recorded per segment. Agreement: 89 %
- For surveillance colonoscopies in longstanding IBD patients, at least one annotated image should be recorded for every lesion biopsied or resected. Agreement: 95 %

Photodocumentation of endoscopic landmarks or lesions during colonoscopy is embedded in several quality recommendations for GI endoscopy [4, 5]. It allows continuous monitoring

for quality purposes and it should be considered to be as important as text descriptions for endoscopic findings [18]. Despite the lack of supporting evidence, the working group members agreed that photodocumentation supports quality control in colonoscopy in IBD patients. Photodocumentation of each inspected segment (i. e. ileum, cecum, ascending, transverse, descending, and sigmoid colon, and rectum) could support optimal diagnosis, assessment of disease activity, and the assessment of future changes in IBD patients, as low interobserver agreement exists regarding endoscopic assessment of disease activity [19, 20].

Annotated photodocumentation of every lesion (biopsied or resected) facilitates accurate interpretation, assists with onward referral, and enables direct comparison if subsequent follow-up procedures are required. The working group members agreed on the definition of annotation, meaning anything that indicates where the picture is taken. Annotation should be interpreted in its most simple form, for example it could be written on the pictures or simply described in the endoscopy report. A minimum standard of 90 % is recommended for adequate photodocumentation in colonoscopy in IBD patients.

When endoscopic software and endoscopy reporting systems support videodocumentation during colonoscopy, this might be superior to photodocumentation in certain situations [21]. However, videodocumentation is not yet widely available and not always easy to incorporate in the endoscopy report. Where videodocumentation is used, annotation by marking the colon segments is recommended to support the interpretation of the videos afterward.

## 3 Clinical suspicion of IBD: completeness of procedure

| Key performance measure | Ileal intubation rate |
|---|---|
| Description | The percentage of colonoscopies reaching the terminal ileum |
| Clinical category | Clinical suspicion of IBD |
| Domain | Completeness of procedure |
| Category | Process |
| Rationale | Complete visualization of the colon and ileal intubation are prerequisites for an adequate inspection of the mucosa of the colon and terminal ileum |
| Construct | **Denominator:** All colonoscopies in suspected IBD patients<br>**Numerator:** Procedures in the denominator that report reaching the ileum |
| Standards | Minimum standard: ≥ 80 %<br>Target standard: ≥ 90 % |
| Consensus agreement | 95 % |
| PICO | 1.1 (see Supporting information) |
| Evidence grading | Low |

The acceptance of this performance measure is based on agreement with the following statement:

- The terminal ileum should be reached in colonoscopies in patients with suspected IBD. Agreement: 95 %

Ileal intubation is essential for identifying ileal Crohn's disease [22]. Most studies support that ileoscopy increases the diagnostic yield when evaluating suspected IBD [23–26]. Reported rates for ileal intubation in colonoscopies in patients with diarrhea have varied widely from 46 % to 96 % [24–26]. There is a scarcity of data regarding the preferred depth of ileal intubation and patient discomfort with ileal intubation in correlation with the sedation used. Furthermore, the existing guidelines do not comment on this subject [27, 28]. Despite the absence of concrete supporting evidence, the members of this working group recommend that endoscopists should aim to achieve terminal ileal intubation in suspected IBD patients (minimum standard: ≥ 80 %; target standard ≥ 90 %).

## 4 Clinical suspicion of IBD: identification of pathology

| Key performance measure | Rate of adequate biopsies |
|---|---|
| Description | The percentage of colonoscopies with adequate biopsies |
| Clinical categories | Clinical suspicion of IBD |
| Domain | Identification of pathology |
| Category | Process |
| Rationale | Adequate biopsies are essential for correct diagnosis in patients with suspected IBD |
| Construct | **Denominator**: All colonoscopies in patients with suspected IBD<br>**Numerator**: Procedures in the denominator with adequate biopsies |
| Standards | Minimum standard: ≥ 80 %<br>Target standard: ≥ 85 % |
| Consensus agreement | 89 % |
| PICO | 1.2 (see Supporting information) |
| Evidence grading | Moderate |

The acceptance of this performance measure is based on agreement with the following statements:

- Adequate biopsies should be taken in patients with a clinical suspicion of IBD, as these are essential for correct diagnosis. Agreement: 89 %
- Adequate biopsies in patients with endoscopic suspicion of IBD should include two biopsies from each of the ileum, cecum, ascending colon, transverse colon, descending colon,

sigmoid, and rectum, including affected and macroscopically normal (if present) mucosa. Agreement: 95 %
- Adequate biopsies in patients with clinically suspected IBD and endoscopically normal mucosa should include at least two biopsies from the terminal ileum in a separate vial. Agreement: 84 %
- Adequate biopsies in patients with suspected Crohn's disease should include biopsies taken from the largest ulcers. Agreement: 95 %

For the clinical category "Endoscopic assessment of disease activity in known IBD," the working group members reached consensus on the following statement:
- Adequate biopsies to assess disease activity in ulcerative colitis (UC) patients with endoscopic inflammation, should include at least two biopsies from the most affected area. Agreement: 100 %

According to clinical practice, evidence from the literature, and statements in relevant guidelines, ileocolonoscopy with histology is the fundamental basis for diagnosing IBD [27–29]. Histology plays a pivotal role in the differentiation between Crohn's disease and UC. Within this context, the distribution and extent of histological pathology can further aid in the differential diagnosis of IBD. This requires a sufficient number of biopsies that are collected separately from the ileum, all colonic segments, and the rectum, as well from endoscopically affected areas and macroscopically normal areas [30]. Providing the pathologist with endoscopic and clinical information further aids in establishing a diagnosis [30]. Biopsies are also crucial for differentiating IBD from other diseases, such as intestinal tuberculosis, amebiasis, amyloidosis, and strongyloidiasis [31–35].

The added value of terminal ileal biopsies in patients with clinically suspected IBD and endoscopically normal mucosa was supported by the literature [36]. Baker et al. reported, in a retrospective analysis, that histological inflammation in biopsies of endoscopically normal terminal ileum was significantly associated with the development of Crohn's disease during a mean follow-up of 6 years compared with the finding of normal histology. Furthermore, no real disadvantages for biopsies in the terminal ileum exist when there is a clinical suspicion of IBD. Therefore, terminal ileal biopsies were recommended to histologically confirm a normal ileum and prevent a patient undergoing a second colonoscopy to exclude IBD in the future.

In active Crohn's disease, histological disease activity scores, proinflammatory gene expression levels, and numbers of myeloperoxidase-positive cells were significantly higher in biopsies from the ulcer edge in the colon and ileum, with decreasing gradients observed with distance from the ulcer edge [37].

In an endoscopically completely normal colon, biopsies are also important to rule out microscopic colitis. Here, ESGE recommends two biopsies from the left colon and two biopsies from the right colon, placed in separate containers and labelled as such [30]. This is supported by the finding of lymphocytic and collagenous colitis presenting histologically as pancolitis, excluding the rectum [38].

The recently published ESGE guideline on tissue sampling in the lower GI tract recommends biopsies in UC patients to evaluate disease activity [30]. A minimum of two biopsies from the worst affected area or the most representative area of mucosal healing, preferably at the edge of any ulcers was recommended. The worst affected area might include an ulcerated anastomosis, where biopsies might differentiate between an IBD-associated ulcer or an ischemic lesion. Histological assessment of biopsies can be used to assess disease activity, the presence of cytomegalovirus, or histological healing, and to optimize therapy by either escalation or exit strategies, predict long-term adverse outcome, and manage patients to achieve treatment targets [30].

Although data on actual adequate biopsies rates are lacking, based on available evidence and expert opinion, a minimum standard of ≥ 80 % was considered appropriate by the working group members.

## 5 Endoscopic assessment of disease activity in known IBD: identification of pathology

| Key performance measure | Rate of endoscopic activity score use |
|---|---|
| Description | The percentage of colonoscopies using endoscopic activity scores for assessment of ulcerative colitis activity |
| Clinical category | Endoscopic assessment of disease activity in known IBD |
| Domain | Endoscopic assessment of disease activity |
| Category | Process |
| Rationale | The use of endoscopic activity scores for the assessment of disease activity in ulcerative colitis is recommended for evaluation of prognosis and efficacy of medical therapy |
| Construct | **Denominator:** All colonoscopies performed to assess disease activity in ulcerative colitis patients **Numerator:** Procedures in the denominator that explicitly include the activity score in the endoscopy report |
| Standards | Minimum standard: ≥ 90 %<br>Target standard: ≥ 95 % |
| Consensus agreement | 100 % |
| PICO | 2.1 and 2.5 (see Supporting information) |
| Evidence grading | Moderate |

The acceptance of this performance measure is based on agreement with the following statement:
- An endoscopic activity score should be used for the assessment of disease activity in ulcerative colitis, the endoscopy report should explicitly include the score used. Agreement: 100 %

Accurate assessment of disease activity and disease extent in patients with IBD is of paramount importance for planning and tailoring treatment strategies [39]. The use of endoscopic disease activity indices to evaluate the prognosis and efficacy of medical treatment in UC patients has been recommended by international guidelines [39]. There are insufficient data to set the minimum and target standards reliably, but the proposed values for the use of an endoscopic activity score for the assessment of disease activity in UC patients of ≥ 90 % and ≥ 95 %, respectively, seem achievable.

Nineteen different endoscopic scoring indices have been partially validated [40]. Among these, the most commonly used are the Mayo Endoscopic score (MES) and the Ulcerative Colitis Endoscopic Index of Severity (UCEIS). Both have been validated for reliability, construct validity, and responsiveness [19, 41–44]. The operating properties of both scores are comparable. However, because the MES is easier to use, it remains the outcome of choice for clinical trials and daily practice [43]. Electronic chromoendoscopy-based scores, such as the Paddington International Virtual Chromoendoscopy Score (PICaSSO), require more real-life, treatment-related studies for their full establishment in both daily practice and clinical trials [45].

Endoscopic activity scores for Crohn's disease are more complex to use; hence their broad implementation into routine clinical practice might be difficult [39]. Therefore, the working group members agreed not to include activity scores for Crohn's disease in the performance measure and statements. Nevertheless, whenever feasible, the working group members recommend using the Simple Endoscopic Score for Crohn's Disease (SES-CD) to assess disease activity in Crohn's disease [46].

## 6 Surveillance: identification of pathology

| Key performance measure | Rate of high definition endoscopy use |
|---|---|
| Description | Percentage of colonoscopies using high definition endoscopy |
| Clinical category | Surveillance |
| Domain | Identification of pathology |
| Category | Process |
| Rationale | High definition endoscopy improves the visualization of the mucosa |
| Construct | **Denominator:** All surveillance colonoscopies in IBD patients<br>**Numerator:** Colonoscopies in the denominator using high definition endoscopy |
| Standards | Minimum standard: ≥ 90 %<br>Target standard: ≥ 95 % |
| Consensus agreement | 100 % |
| PICO | 3.2 (see Supporting information) |
| Evidence grading | Moderate |

The acceptance of this performance measure is based on agreement with the following statement:

- High definition endoscopy should be used for surveillance in longstanding colitis. Agreement: 100 %

Patients with longstanding IBD are at increased risk of developing colorectal cancer, with an estimated risk of approximately 18 % after 30 years with the diagnosis [47, 48]. Consequently, patients are recommended to undergo screening colonoscopy with the aim of detecting premalignant dysplastic lesions [8, 28] The use of high definition endoscopy is strongly recommended in current guidelines for surveillance in longstanding IBD patients [8, 27–29]. High definition endoscopy significantly improves the detection of dysplastic lesions in surveillance colonoscopy in IBD patients compared with standard definition endoscopy [49]. The improved visualization of the mucosa enables detection of most dysplastic lesions [50, 51]. This improved visualization, combined with a lack of adverse effects when using high definition endoscopy, resulted in a proposed minimum standard of ≥ 90 % and target standard of ≥ 95 % for the use of high definition endoscopy in longstanding IBD patients.

| Key performance measure | Rate of chromoendoscopy use |
|---|---|
| Description | Percentage of surveillance colonoscopies using dye-based or virtual chromoendoscopy combined with targeted biopsies in longstanding IBD patients |
| Clinical category | Surveillance |
| Domain | Identification of pathology |
| Category | Process |
| Rationale | The use of chromoendoscopy and targeted biopsies during surveillance colonoscopy in longstanding IBD patients improves the detection of dysplastic lesions |
| Construct | **Denominator**: All surveillance colonoscopies in longstanding IBD patients<br>**Numerator**: Colonoscopies in the denominator using dye-based or virtual chromoendoscopy combined with targeted biopsies |
| Standards | Minimum standard: ≥ 70 %<br>Target standard: none set |
| Consensus agreement | 95 % |
| PICO | 3.2 and 3.3 (see Supporting information) |
| Evidence grading | Moderate |

The acceptance of this performance measure is based on agreement with the following statement:

- Dye-based or virtual chromoendoscopy in combination with targeted biopsies should be used in surveillance colonoscopy in longstanding IBD patients. Agreement: 95 %

The routine use of dye-based pancolonic chromoendoscopy or virtual chromoendoscopy with targeted biopsies for neoplasia surveillance in patients with longstanding colitis, in the situation of quiescent disease activity and adequate bowel preparation, has already been recommended by the ESGE Guideline on advanced imaging for detection and differentiation of colorectal neoplasia [52]. Virtual chromoendoscopy has emerged as an attractive alternative to overcome the laboriousness of dye-based chromoendoscopy. The current evidence showed no significant difference between the two techniques for dysplasia detection [53–55].

Numerous academic studies, predominantly at tertiary centers, have demonstrated the low yield of nontargeted biopsies for dysplasia detection [56–59]. In addition, nontargeted random biopsies cause a significant workload for both endoscopists and pathologists. The value of continuing four-quadrant biopsies, both in terms of effort and cost, has been questioned as their yield is so low compared with targeted approaches, on the basis of both dysplasia detected per patient and dysplasia detected per sample. However, the literature supports that, for certain high risk subsets of IBD patients (i. e. primary sclerosing cholangitis), four-quadrant or random biopsies may still have a role [60, 61]. Therefore, when using chromoendoscopy for IBD surveillance, the use of targeted biopsies only is recommended as an easily measurable quality indicator.

A minimum standard of ≥ 70 % may seem relatively low. However, it allows a different strategy to be followed in a selected number of colonoscopies. For example, in high risk patients with a family history of colonic neoplasia, a tubular-appearing colon, or primary sclerosing cholangitis, where endoscopists may opt to take random biopsies in addition to targeted biopsies, as suggested in the ESGE tissue sampling guideline for the lower GI tract [30].

Although no significant learning curve was observed for the use of chromoendoscopy [62], the working group members agreed that endoscopists should be adequately trained according to the recently published ESGE curriculum [63].

| Minor performance measure | Neoplasia detection rate |
|---|---|
| Description | Percentage of colonoscopies with at least one neoplastic lesion detected during surveillance of longstanding colitis |
| Clinical category | Surveillance |
| Domain | Identification of pathology |
| Category | Process |
| Rationale | Neoplasia detection rate reflects adequate inspection of the bowel mucosa |
| Construct | **Denominator**: All surveillance colonoscopies in longstanding IBD patients<br>**Numerator**: Colonoscopies in the denominator in which at least one neoplastic lesion was identified<br>**Exclusions**: Patients with incomplete colonoscopy |
| Standards | Minimum standard: ≥ 8 %<br>Target standard: none set |
| Consensus agreement | 89 % |
| PICO | 3.4 (see Supporting information) |
| Evidence grading | Low |

The acceptance of this performance measure is based on agreement with the following statement:

- The detection rate of neoplastic lesions in surveillance colonoscopies in longstanding IBD patients should be more than 8 %. Agreement: 89 %

Current surveillance strategies in IBD patients aim to identify dysplasia and prevent progression to CRC. Interval cancers are significantly more frequent in IBD patients compared with non-IBD patients and are most likely due to undetected or incompletely resected dysplastic lesions [8, 64, 65]. While the correlation between the adenoma detection rate and the risk of developing interval cancers is solid in a screening population [66, 67], it is still debatable in IBD. Nevertheless, applying a neoplasia detection rate as a performance measure for surveillance colonoscopy in IBD patients seems reasonable.

The neoplasia detection rate has already been incorporated into the ESGE curriculum for optical diagnosis [63]. In the literature, neoplasia detection rates vary between 10 % and 26 % in surveillance colonoscopies in longstanding IBD patients [53, 62, 68]. Current literature on neoplasia detection rates in longstanding IBD patients comes mainly from academic services and it can be assumed that there will likely be differences in the prevalence of dysplasia and treatment preferences between countries [69, 70]. Furthermore, owing to improved treatment of IBD, the prevalence of neoplasia might also fall and, with frequent surveillance, it seems unlikely that many dysplastic lesions will be found in longstanding IBD patients. Therefore, the working group members considered a minimum standard

of ≥ 8 % achievable for the neoplasia detection rate in surveillance colonoscopies in longstanding IBD patients. In addition, because of the uncertainty of the prevalence and incidence in a nontertiary setting, this quality indicator was qualified as a minor performance measure.

## Conclusions

This paper describes the key performance measures for colonoscopy in IBD patients. These measures were supported by the available evidence where possible or based on an expert consensus between the working group members and were regarded as feasible to measure in endoscopy services throughout Europe and other interested countries. As there is limited evidence to support performance measures for all clinical categories for colonoscopy in IBD patients, most evidence was graded as moderate or low quality. This generated future research priorities, primarily to audit the proposed performance measures and to evaluate if these proposed measures do actually improve the care of IBD patients.

Similarly to the previously published ESGE quality improvement initiatives, the first step should be to implement these key performance measures for colonoscopy in IBD patients in endoscopy services throughout Europe and other interested countries. The ESGE recently published recommendations to overcome barriers in dissemination and implementation of quality measures for GI endoscopy [71]. The dissemination and implementation of performance measures are important to identify services and endoscopists with substandard levels of performance. Furthermore, the ESGE recommendations on endoscopy reporting systems will support endoscopy services to facilitate quality monitoring in daily practice [72]. Adequate quality monitoring will enable the principle of audit and feedback; this principle has been proven to improve the quality of care [73].

Financial or logistical issues may cause barriers for optimal implementation of quality control systems. However, in an era where hospital accreditation is becoming increasingly important, hospital administrations are expected to be more inclined to support the need for such developments. Furthermore, investments in hardware will support endoscopy services in broad quality assessment for all types of endoscopy. Moreover, we should overcome financial, individual, or logistical barriers to aim for the highest possible quality in our endoscopy services to ensure the best possible outcomes for our patients.

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## Competing Interests

R. Bisschops has received research grants and speaker's fees from Fujifilm, Norgine, and Pentax; he has provided consultancy for Fujifilm, Norgine, and Pentax. E. Dekker has received a research grant and has endoscopic equipment on loan from Fujifilm; she has received speaker's fees from Olympus, GI Supply, Norgine, Ipsen, Paion, and Fujifilm; she has provided consultancy for Fujifilm, Olympus, GI Supply, Paion, and Ambu. J.E. East has received speaker's fees from Falk and Jenssen, has served on clinical advisory boards for Paion, and has served on the clinical advisory board and has share options in Satisfai Health. M. Iacucci has received research grants from Olympus, Pentax, and Fujifilm. M.F. Kaminski has equipment on loan from Fujifilm; he has received speaker's fees from Boston Scientific, Ipsen, and Recordati, and a research grant from Olympus; he has provided consultancy for Olympus and ERBE. J.G. Karstensen has received speaker's fees from Norgine and provided for consultancy from Ambu and SNIPR Biome. M. Keuchel has received speaker's fees from Medtronic and Olympus, and study support from AnXRobotics; he has provided consultancy for Medtronic. M. Pellisé has provided consultancy to Norgine Iberia, GI Supply, and Fujifilm; she has served on the editorial board of Thieme, has been the ESGE equity and diversity working group chair and a councillor for SEED, and is president elect of AEG; her department has received research support from Fujifilm and Casen Recordat. L. Peyrin-Biroulet has received personal fees from Abbvie, Janssen, Takeda, and Celltrion. None of the above conflicts of interest are of relevance to this manuscript. M. Bugajski, C. Carretero, G. Cortas, E.J. Despott, M. Löwenberg, A. Monged, A. Murino, K.J. Nass, O.M. Nardone, H. Neumann, M. Omar, and M.D. Rutter declare that they have no conflict of interest.

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# Supplementary material

**Supporting information: Performance measures for colonoscopy in inflammatory bowel disease (IBD) patients**



Further supporting information (details of the Delphi Process and PICO tables surveillance) is available on the ESGE website, see https://www.esge.com/performance-measures-for-colonoscopy-in-ibd-patients/

 

## Supplementary material

Potential performance measures Quality in IBD colonoscopy

*March 2021*

- Scores based on prioritizing by experts
- Items prioritized with 1 → 5 points, 2 → 4 points, 3 → 3 points, 4 → 2 points, ≥5 → 1 point, no prioritization → 0 points
- Scale scores: 0-5 (5 = highest = regarded most relevant)
- NB: Added measures are not prioritized/scored by all experts.

| Potential performance measures Suspected IBD | Number of experts | Mean score |
|---|---|---|
| **Ileum intubation** | 16 | 4.25 |
| **Biopsies taken** | 16 | 3.88 |
| **Indication** | 16 | 3.19 |
| **Complications** | 3 | 2.67 |
| **Photo/video documentation (and adequate description)** | 7 | 2.57 |
| **Adequate bowel prep** | 16 | 2.56 |
| **Use of disease activity score (validated) (only in IBD for indication suspected IBD)** | 16 | 1.81 |
| **Patient tolerance and sedation*** | 2 | 1.50 |
| **Mircrobiology** | 4 | 1.25 |
| **Withdrawal time** | 16 | 1.13 |
| **High-definition imaging** | 1 | 1.00 |
| **Neoplasia detection rate** | 16 | 0.31 |
| **Chromoendoscopy rate** | 16 | 0.19 |
| **En bloc dysplasia resection/ endoscopic treatment** | 3 | 0.00 |
| **Follow up surveillance (timing repeat endoscopy)** | 3 | 0.00 |
| **IBD cases yearly overload** | 3 | 0.00 |
| **Further diagnostics recommended** | 1 | (if colon is normal) |
| ***1 expert addressed this item without prioritizing** | | |

## Supplementary material

| Potential performance measures Disease activity | Number of experts | Mean score |
|---|---|---|
| **Use of disease activity score (validated)** | 16 | 4.6 |
| **High-definition imaging** | 1 | 4.0 |
| **Patient tolerance and sedation*** | 2 | 3.5 |
| **Indication (timing)** | 16 | 2.9 |
| **Adequate bowel prep** | 16 | 2.8 |
| **Biopsies taken (segmental for disease assessment)** | 16 | 2.7 |
| **Complications** | 3 | 2.7 |
| **Ileum intubation** | 16 | 2.6 |
| **Mircrobiology** | 4 | 2.5 |
| **Photo/video documentation (and adequate description)** | 7 | 2.4 |
| **En bloc dysplasia resection/ endoscopic treatment** | 3 | 1.7 |
| **Withdrawal time** | 16 | 0.9 |
| **Neoplasia detection rate** | 16 | 0.5 |
| **Chromoendoscopy rate** | 16 | 0.4 |
| **Follow up surveillance (timing repeat endoscopy)** | 3 | 0.3 |
| **IBD cases yearly overload** | 3 | 0.0 |
| **Further diagnostics recommended** | 1 | (SB assessment) |
| ***1 expert addressed this item without prioritizing** | | |

## Supplementary material

| Potential performance measures Surveillance | Number of experts | Mean score |
|---|---|---|
| **Neoplasia detection rate** | 16 | 4.2 |
| **Adequate bowel prep** | 16 | 3.9 |
| **Patient tolerance and sedation*** | 2 | 3.5 |
| **Chromoendoscopy rate (virtual or dye)** | 16 | 3.4 |
| **En bloc dysplasia resection/ endoscopic treatment** | 3 | 3.3 |
| **Follow up surveillance (timing repeat endoscopy)** | 3 | 3.3 |
| **High-definition imaging** | 1 | 3.0 |
| **IBD cases yearly overload** | 3 | 2.7 |
| **Biopsies taken (targeted for surveillance; random high risk patients)** | 16 | 2.6 |
| **Complications** | 3 | 2.3 |
| **Photo/video documentation (and adequate description; presence of risk factors for dysplasia)** | 7 | 2.3 |
| **Withdrawal time** | 16 | 2.2 |
| **Indication (timing)** | 16 | 1.6 |
| **Use of disease activity score (validated) + Paris modified classification for surveillance** | 16 | 1.5 |
| **Ileum intubation** | 16 | 0.9 |
| **Mircrobiology** | 4 | 0.0 |
| **Further diagnostics recommended** | 1 | *NA* |
| ***1 expert addressed this item without prioritizing** | | |

# Supplementary material

**PICOs and summary of literature task force subgroup: Clinical suspicion of IBD**

**Key performance indicators:**

1.1 Ileal intubation (Edward J. Despott)

1.2 Biopsies (Martin Keuchel)

1.3 Photo Video Documentation (Cristina Carretero)

**Minor performance measures (not included for voting):**

1.4 Use of standard terminology (Alberto Murino)

1.5 Indication (Ashraf Monget)

1.6 Bowel prep (Ashraf Monget)

1.7 Complication (Karlijn Nass)

**References**

## Supplementary material

### 1.1 Ileal intubation

| P | I | C | O | First authors | |
|---|---|---|---|---|---|
| Suspected or established colonic inflammation undergoing colonoscopy | TI intubation | No TI intubation | May increase DY in up to 49% | Yusoff, Morini, Geboes, Mari | |

The evidence is based mainly on prospective and retrospective observational studies and case series. There have been no randomized controlled trials undertaken on this subject.

It has been reported that terminal ileum (TI) intubation adds a mean of 3.4 minutes to the total procedure time (1) and another recent study showed that the mean time taken to reach the ileum from the cecum was 63.08±64.16 seconds (2).

The diagnostic value of routine ileoscopy remains controversial and routine performance of TI intubation during colonoscopy is perceived to have a low yield (as low as 0.3%) (3).

Variable diagnostic yields for TI intubation are reported when applied to suspected IBD patients and this ranges from 5 to 49%. Most studies support that ileoscopy may have high utility in evaluating suspected IBD (4-6). Biopsies taken from an endoscopically normal TI have low additional yield (4,7,8). On the other hand, biopsies from an endoscopically abnormal TI show higher yield and are therefore more likely to be of diagnostic value (7,8, 9, , 5, 2).

There is a scarcity of data regarding the depth of ileal intubation and patient discomfort with ileal intubation in correlation with the sedation. Furthermore, the existing guidelines do not comment on the subject. Despite the absence of concrete supporting evidence, this working group however recommends that endoscopists should aim to achieve TI intubation (if this is safe and possible in all cases of suspected IBD.

## Supplementary material

**1.2 Adequate biopsies performed during ileo-colonoscopy for suspected IBD.**

Aim 85%, minimum 80%.

Nominator: Ileo-colonoscopies with adequate biopsies.

Denominator: all complete ileo-colonoscopies, excluding emergency procedures, and patients with severe coagulopathies

Adequate biopsies in suspected IBD:

- In patients with endoscopic suspicion of IBD: 2 biopsies each from ileum, cecum, ascending colon, transverse colon, left colon, and rectum including affected and normal (if present) mucosa.
- In patients with suspected IBD and endoscopically normal mucosa: At least 2 biopsies from right and 2 biopsies from left colon in separate vials
- In patients with suspected Crohn´s disease: biopsies included from the edge of (largest) ulcers.
- Biopsies from different segments provided in separate identifiable vials with formalin.
- Endoscopic and clinical information provided to the pathologist.

**Rationale:**

According to clinical practice, evidence from literature and statements of relevant guidelines ileo-colonoscopy with histology is a mainstay in diagnosis of IBD. Histology plays an important role in differentiation between CD and UC. Within this context, distribution and extent of histologic pathology can further aid in the differential diagnosis of IBD. This requires a sufficient number of biopsies separately from ileum, all colonic segments, and rectum, as well from endoscopically affected areas as from macroscopically normal areas. Providing the pathologist with endoscopic and clinical information further aids in establishing a diagnosis.

In active Crohn´s disease, histological disease activity scores ($P < 0.0001$), proinflammatory gene expression levels ($P < 0.005$) and numbers of myeloperoxidase-positive cells ($P < 0.0001$) were highest in biopsies from the ulcer edge in the colon and ileum, with decreasing gradients observed with distance from the edge ($P < 0.05$). [1]

  

## Supplementary material

Biopsies are also crucial for differentiation of CD and UC from other diseases (Bernstein et al. 2016) [2] with sometimes diametrically different treatment as for instance intestinal tuberculosis (Ye et al. 2015 [3]), amebiasis (Singh 2015 [4]), Amyloidosis (Hokama 2011[5]), Strongyloidiasis [6].

In endoscopically completely normal colon, biopsies are also important to rule out microscopic colitis. Here, a smaller number of biopsies and vials might be enough, when including biopsies from ascending and descending colon [7] This is supported by the finding of lymphocytic and collagenous colitis presenting histologically as pancolitis, excluding the rectum (Fiehn 2021) [8].

**PICOs**

| **P** | **I** | **C** | **O** | First author | |
|---|---|---|---|---|---|
| Suspected or established colonic inflammation undergoing colonoscopy | | 2 biopsy specimens from macroscopic inflammation or from normal colon (if endoscopically completely normal | Changes in diagnosis in 66% | Dejaco, et al. 2003 [9] | |
| | Additionally, 2 biopsies from segments (cecum, ascending, transverse, descending, sigmoid, rectum, and terminal ileum (if possible) | | Additional changes in diagnosis in 26% | | |
| | Additionally, providing endoscopic findings | | Additional changes in diagnosis in 2.5 % | | |

## Supplementary material

| | | | | | |
|---|---|---|---|---|---|
| | Additionally, providing clinical data | | Additional changes in diagnosis in 5.5 % | | |
| **In a one center, prospective study 2 colon biopsies each in 200 patients with suspected or visible colonic inflammation changed endoscopic diagnosis in 2/3. Segmental biopsies including terminal ileum led to changes in diagnosis in 26%, providing pathologist additionally with endoscopic findings to another 2.5%, and clinical data to 5.5%, respectively. High level of evidence** | | | | | |
| | | | | | |
| **P** | **I** | **C** | **O** | First author | |
| Pat. With **microscopic colitis** | | Biopsies of sigmoid and rectum | Histologic diagnosis<br>*93% collagenous colitis*<br>*94% lymphocytic colitis* | Macaigne 2017[10] | |
| | Biopsies beyond left flexure | | Histologic diagnosis in 100% | | |
| **Biopsies performed in a prospective multicenter study with 95 patients with microscopic colitis were diagnostic in 93% collagenous colitis, and in 94% in lymphocytic colitis, respectively, and diagnostic in 100% when biopsies proximal to the left flexure were included (High level of evidence).** | | | | | |
| **P** | **I** | **C** | **O** | First author | |
| **Ileocolonoscopy for suspected IBD** | Microscopic ileitis | | 19% development of Crohns | Baker, 2020[11] | |
| | | Normal histology | 2 % development of Crohns | | (19% vs 2%, OR = 11.98, 95%CI = 4.48–32.01; $p < 0.01$). |
| | Granuloma or moderate-severe ileitis on biopsy | | 100% development of Crohns | | |

## Supplementary material

| | | | | | |
|---|---|---|---|---|---|
| | | Mild or nonspecific inflammation. | 11 % development of Crohns | | (100% vs 11%; P < 0.01) |
| **Histologic inflammation in biopsies of endoscopically normal terminal ileum (n=64) was significantly associated with development of Crohn´ s disease during mean follow-up of 6 years in a retrospective analysis compared to controls with normal histology (n=375) (moderate level of evidence)** | | | | | |
| Patients with **microscopic colitis** | Biopsies from: | | Diagnosis in | First author | |
| | | Combined ascending and descending colon biopsies | 100% | Virine et al. 2020 [7] | |
| | cecum | | 90.0% | | |
| | ascending colon | | 96.9% | | |
| | hepatic flexure | | 77.8% | | |
| | transverse colon | | 95.7% | | |
| | splenic flexure | | 75.0% | | |
| | descending colon | | 85.0% | | |
| | sigmoid colon | | 90.9% | | |
| | rectum | | 82.2% | | |
| **Retrospective study on 101 patients with microscopic colitis found that biopsies combined from ascending and descending colon were sufficient for diagnosis compared with other single colon segments ranging from 72.8 to 95.7% (moderate level of evidence)** | | | | | |

## Supplementary material

| **P** | **I** | **C** | **O** | First author | Comments |
|---|---|---|---|---|---|
| Active **Crohn´s** | **Biopsy distance from edge of largest ulcer** | | Mean Global Histological Disease Activity Score (95% CI) | Novak, G. 2019 [1] | Score 0–16 (≤4 indicates remission; >10 severe disease |
| | **Colon** | | | | |
| | 0 mm | | 10.1 *(8.5, 11.7)* | | P < 0.0001 vs. (7-8 mm) and vs (21-24 mm) |
| | | 7 to 8 mm | 5.2 *(3.4, 6.9)* | | P < 0.05 vs. (21-24 mm) |
| | | 21 to 24 | 4.2 *(2.5, 5.8)* | | |
| | **Ileum** | | | | |
| | 0 mm | | 8.3 *(6.9, 9.6)* | | P < 0.0001 vs. (7-8 mm) and vs (21-24 mm) |
| | | 7 to 8 mm | 5.1 *(3.6, 6.6)* | | P < 0.05 vs. (21-24 mm) |
| | | 21 to 24 | 3.1 *(1.6, 4.6)* | | |
| **Biopsies taken from the edge of largest ulcer had significantly higher histologic activity index than biopsies taken in 7-8 mm and 21-24 mm distance in 51 patients with active Crohn´ s disease in a prospective 3 center study (Moderate level of evidence)** | | | | | |

**Guidelines**

**ECCO 3rd European Evidence-based Consensus on the Diagnosis and Management of Crohn's Disease 2016**.

Part 1: Diagnosis and Medical Management Gomollon et al. 2017) [12].

Statement 2F: For suspected CD, ileocolonoscopy and biopsies from the terminal ileum as well as each colonic segment to look for microscopic evidence of CD are first line procedures to establish the diagnosis [EL1]

## Supplementary material

**ECCO Position Paper: Harmonization of the Approach to Ulcerative Colitis Histopathology** Magro et al. 2020 [13]

Position 2.1For a reliable diagnosis of ulcerative colitis, ileocolonoscopy should be performed. A minimum of two biopsies from each of five sites in colorectum and terminal ileum should be obtained. [Evidence Level 2] Additional biopsies should be taken from the endoscopically most severely affected area, specifically at the edge of ulcers if present. [Evidence Level 3]—Agreement 80%

Position 2.2: The biopsies should be collected in separate vials corresponding to separate anatomical sites, because localization of the biopsies gives important diagnostic information. [Evidence Level 5]—Agreement 100%

All tissue samples should be fixed immediately by immersion in buffered formalin or an equivalent solution prior to transport. [Evidence level 5]—Agreement 100%

**BSG: Inflammatory bowel disease biopsies: updated British Society of Gastroenterology reporting guidelines (**Feakins RM. Et al. 2013) [14] BSG [14]

Biopsies from endoscopically normal and abnormal mucosa should be available.

For optimal diagnosis and classification of IBD there should be samples of the ileum, at least four colonic sites, and the rectum, with a minimum of two biopsies from each site (EL1b RGB).

Biopsies should be submitted in such a way that their site of origin can be determined, for example, using multiple specimen containers, acetate strips, or multiwell cassettes.

Biopsies for the diagnosis of IBD should be accompanied by a full clinical history and a record of endoscopic findings (EL2a RGB). The history should include the duration of disease and details of medical and surgical treatment.

**DGVS (German Society for Gastroenterology) 2020**. **DGVS 2020 Ulcerative colitis**

Recommendation 2.14: In **suspected UC**, ileo-colonoscopy with biopsies from terminal ileum and all colonic segments including the rectum (at least two biopsies per segment submitted in different vials) should be performed to make the diagnosis and assess the extension of disease. Evidence level 4, strength of recommendation B, consensus (Kucharzik et al.2020) [15]

## Supplementary material

**DGVS 2014**: For a reliable diagnosis of **Crohn´s disease** at least 2 biopsies each from ileum, and 5 colonic segments should be taken. The rectum should be biopsied as well. (Evidence level II, strong recommendation, strong consensus). Preiß et al. 2014 [16]

**Endoscopic tissue sampling- Part 2: Lower gastrointestinal tract. European Society of Gastrointestinal Endoscopy (ESGE) Guideline, published 2021**

**1.1 Clinical and endoscopic signs of colitis.**

ESGE suggests segmental biopsies (at least 2 from each segment) in different specimen jars (ileum, ascending, transverse, descending colon, sigmoid and rectum). (weak recommendation, low quality of evidence); ESGE suggests informing the pathologist on endoscopic features of the colitis and relevant clinical data. (weak recommendation, low quality of evidence)

**1.2. Clinical suspicion, but no endoscopic signs of colitis**

ESGE recommends taking 2 biopsies from the left colon and in a separate jar 2 biopsies from the right colon. (strong recommendation, low quality of evidence)

**United European Gastroenterology and European Microscopic Colitis Group (**Miehlke et al. 2021) [17]

European guidelines on microscopic colitis: United European Gastroenterology and European Microscopic Colitis Group statements and recommendations group statements and recommendations.

Recommendation 4.5: We recommend ileocolonoscopy with biopsies from at least the right and left side of the colon. LE: high; GR: strong in favour; agreement: 100%, strong consensus

**World Gastroenterology Organisation** Global Guidelines Inflammatory Bowel Disease Update August 2015

Histopathology Biopsies are routinely obtained during endoscopy. It is important for the endoscopist to consider what specific question he or she is asking of the pathologist with each biopsy sample submitted for evaluation. Some of the important reasons for obtaining biopsies include: Assessment of crypt architecture distortion, “cryptrunting,” increased subcryptal space, and basal plasma-cytosis. These are features of chronic colitis and would be atypical in acute infectious colitis. Assessment of noncaseating granulomas, which would be suggestive of CD. Large or necrotic/caseating granulomas should alert the physician to the diagnosis of TB, especially in regions in which TB is endemic. Identifying histologic changes in areas of normal endoscopy to fully stage the extent of disease. [2]

## Supplementary material

Bernstein CN, Fried M, Krabshuis JH et al. World Gastroenterology Organization Practice Guidelines for the diagnosis and management of IBD in 2010. Inflamm Bowel Dis 2010; 16: 112–124



**TABLE 4.** Main Differential Diagnoses for UC and CD

| | UC | CD |
|---|---|---|
| Main DDs | Acute self-limiting colitis<br>Amebic colitis<br>Schistosomiasis<br>CD<br>Colon cancer<br>IBS (if there are inflammatory changes, it is not IBS)<br>Intestinal TB<br>NSAID enteropathy | Intestinal TB<br>Behçet disease<br>UC<br>NSAID enteropathy<br>IBS<br>Celiac disease |
| Other DDs | Infectious colitis, ischemic colitis, radiation colitis, Henoch-Schönlein purpura, collagenous or lymphocytic colitis, Behçet disease, colitis complicated by HIV | Ischemic colitis, microscopic colitis, radiation colitis, diversion colitis, chronic diverticulitis, and drug-induced enteropathy (eg, NSAID), eosinophilic enteritis, intestinal lymphoma, and colon cancer |

CD indicates Crohn's disease; DD, differential diagnosis; HIV, human immunodeficiency virus; IBS, irritable bowel syndrome; NSAID, nonsteroidal anti-inflammatory drug; TB, tuberculosis; UC, ulcerative colitis.

## Supplementary material

### 1.3 Photodocumentation

| P | I | C | O | Reference |
|---|---|---|---|---|
| Suspected IBD | Landmarks& pathology Photodocumentation | No photodocumentation | Detection of lesions and disease staging | 1-4 |

**Photodocumentation of normal findings and complete examinations is recommended.**

As for any colonoscopy, quality image documentation is necessary to document endoscopic findings and interventions (1). It allows continuous monitoring for quality purposes (2) and it should be considered as important as text descriptions for endoscopic findings (3).

**Anatomical landmark photographs that are recommended:**

ESGE suggested in 2012 a set of 9 images to be taken(4)(1):

1 – Lower part of the rectum in retroflexed view;

2 – Lower part of the rectum (taken 2 cm above the anal line);

3 – Middle part of the sigmoid;

4 – Descending colon just distal to the splenic flexure;

5 – Transverse colon just proximal to the splenic flexure;

6 – Transverse colon just distal to the hepatic flexure;

7 – Ascending colon just proximal to the hepatic flexure;

8 – Cecum and ileocecal valve;

9 – Cecum and appendiceal orifice.

## Supplementary material

However, as it has not been widely adopted, a minimum set of images could be considered, including at least (3):

- Cecum, including the appendiceal orifice
- Ileocecal valve
- Distal ileum
- The least cleansed of the three segments (to show general imaging quality)
- Retroflex view in the rectum—if performed.

**Photodocumentation of focal and diffuse pathology is recommended**

In patients with suspected inflammatory bowel disease, documentation of pathology is vital to show location, characterization, and for assessment of future changes (3).

In cases of diffuse pathology, as inflammatory bowel disease, one overview image and one close-up image from the most affected area should be recorded. In cases of pancolitis, each segment should be documented with one image from its most affected area (3).

Supplementary pictures showing typical areas of disease may also be of interest, in addition to images of maximal injury (3).

## Supplementary material

### Minor Key Performance

### 1.4 Standard descriptive terminology

### Statements

There is not a broadly accepted terminology used to describe endoscopic findings in patients with suspected IBD. Most of the papers/authors use the description provided by the endoscopic scoring systems.

Table 1 described by *Anese V. et al.* at the *European evidence based consensus for endoscopy in inflammatory bowel disease,* consists an interesting map on that field.

Table 1

**Table 2.1** Terminology of endoscopic lesions in IBD.

| Mucosal damage | Description | Grading |
|---|---|---|
| Loss of vascular pattern | Loss of normal mucosal appearance without well-demarcated, arborizing capillaries | From patchy or blurred to complete loss |
| Erythema | Unnaturally reddened mucosa | From discrete or punctiform to diffuse erythema |
| Granularity | Mucosal pattern produced by a reticular network of radiolucent foci of 0.5–1 mm of diameter with a sharp light reflex | From fine to coarse or nodular, due to abnormal light reflection |
| Friability/bleeding | Bleeding or intramucosal haemorrhage before or after the passage of the endoscope | From contact bleeding (bleeding with light touch) to spontaneous bleeding |
| Erosion | A definite discontinuation of mucosa less than 3 mm in size. Also described as pinpoint ulceration | Isolated, diffuse |
| Aphthous ulcer | White depressed center surrounded by a halo of erythema; (some consider this synonymous with 'erosion') | Isolated, multiple |
| Ulcer | Any lesion of the mucosa of unequivocal depth, with or without reddish halo | Isolated or multiple based on morphology: circular, linear, stellar, serpiginous, irregular shape Superficial or deep |
| Ulcer size (no underscore) | Defined in mm or classified as: ≤5 mm; 5–20 mm; >20 mm | Diffuse, mucosal abrasion with residual mucosa producing a polypoid appearance |
| Ulcer depth (no underscore) | Shallow (localized to submucosa)—no border Deep (beyond muscularis propria)—e.g. edges elevated >1 mm | |
| Stenosis | Narrowing of the lumen | Single, multiple, passable (by standard adult endoscope), un-passable, passable after dilation Ulcerated, non-ulcerated |
| Post-inflammatory polyps (previously 'pseudopolyp') | Polypoid lesion, usually small, glistering, isolated or multiple, scattered throughout the colon. Sometimes cylindrical or giant (>2 cm) in size | Isolated, diffuse, occluding ('giant') |
| Cobblestone | Mucosal pattern with raised nodules, resembling the paving of a "Roman" road | With or without ulceration |

Table 2 was proposed by *Mary JY et al.* The presence of mucosal lesions was recorded by ticking a list of nine items in their aim to develop and validate an endoscopic index for assessing the severity of Crohn's disease - ***Crohn's Disease Endoscopic Index of Severity (CDEIS).*** The CDEIS is based upon the

## Supplementary material

presence or the absence of 4 types of lesions: superficial ulcers, deep ulcers, ulcerated stenosis, or non ulcerated stenosis all of which are recorded in 5 different alimentary segments.

Table 2

Table 1 *List of the nine mucosal lesions recorded*

| *Lesions* | *Definitions or specifications* |
|---|---|
| 1 Pseudopolyp | – |
| 2 Healed ulceration | Whitish area with a 'ground glass' appearance |
| 3 Frank erythema (plaques, bands or diffuse) | Slight or moderate erythema should be neglected |
| 4 Frankly swollen mucosa | Slight or moderate mucosal swelling should be neglected |
| 5 Aphthoid ulceration | Defined as a tiny (2–3 mm), raised or flat red lesion with a white centre |
| 6 Superficial or shallow ulceration | Defined as any ulceration which was neither aphthoid nor deep |
| 7 Deep ulceration | Only frankly deep ulcerations should be recorded under this heading |
| 8 Non ulcerated stenosis | Should be impossible or difficult to pass with an adult endoscope |
| 9 Ulcerated stenosis | Should be impossible or difficult to pass with an adult endoscope |

The Capsule Endoscopy Crohn's Disease Activity Index (CECDAI) was devised to measure mucosal disease activity of the small bowel using capsule endoscopy (CE).

The Lewis score, this CE scoring index may be useful in measuring small bowel mucosal disease activity on CE and in objective scoring of small bowel inflammatory disease states. In addition to the original five endoscopic parameters erythema, oedema, nodularity, ulcer and stenosis, this working group assessed additional new endoscopic parameters seen on CE including villous appearance and denuded mucosa. Denuded small bowel lesions were defined as a loss of villous architecture without a clear breach of the epithelium, which may or may not be associated with erythema.

## Supplementary material

**SUPPLEMENTAL TABLE A. Capsule Endoscopy Crohn's Disease Activity Index[110]**

| Score type | 0 | 1 | 2 | 3 | 4 | 5 | Proximal | Distal |
|---|---|---|---|---|---|---|---|---|
| A. Inflammation | None | Mild to moderate edema/hyperemia/ denudation | Severe edema/hyperemia/ denudation | Bleeding, exudate, aphthae, erosion, small ulcer (<0.5 cm) | Moderate ulcer (0.5-2 cm), pseudo polyp | Large ulcer (>2 cm) | | |
| B. Extent of disease | No disease, normal examination | Focal disease (single segment involved) | Patchy disease, 2-3 segments involved | Diffuse disease (>3 segments involved) | | | | |
| C. Stricture | None | Single-passed | Multiple-passed | Obstruction (no passage) | | | | |
| | | | | | | Segmental score = (A × B) + C | | |
| | | | | | | Total score = proximal segmental score + distal segmental score | | |

Further endoscopic scores have been established for the management of IBD and include terminology of endoscopic findings, such as the Mayo endoscopic score and Ulcerative Colitis Endoscopic Index of Severity (UCEIS) for UC and the Simple Endoscopic Score for Crohn's Disease (SES-CD) and the Rutgeerts score for CD.

## Supplementary material

1.5 **Indication**

**Statements:**

- The colonoscopy report should include an explicit indication for the procedure, categorized according to existing guidelines on appropriate use of colonoscopy (the ASGE or the EPAGE II guidelines)
- A service should have a minimum of ≥ 85 % procedures and a target of ≥ 95 % procedures with proper indications. Continuous monitoring using novel endoscopy reporting systems should be the preferred approach; an alternative approach is a yearly audit of a sample of 100 consecutive LGI endoscopies for suspected IBD cases.

Descriptive based evidence background:

Loose stools for more than 6 weeks usually discriminate IBD-associated colitis from most cases of infectious diarrhea [1].Unless contraindicated, a full colonoscopy with intubation of the terminal ileum should always be performed during the initial evaluation of patients with clinical presentations suggestive of IBD [2]. Sodium phosphate–based bowel cleansing regimens [3] and nonsteroidal anti-inflammatory drug (NSAID) [4] use should be discouraged before the examination, because both can cause mucosal changes mimicking IBD. Appropriate referrals for colonoscopy may help to optimize the use of limited resources and protect patients from the potential harms of unnecessary invasive procedures [5].

Colonoscopies with an appropriate indication are associated with significantly higher diagnostic yields than colonoscopies without an appropriate indication [6-9]. The American Society for Gastrointestinal Endoscopy (ASGE) and the European Panel on the Appropriateness of Gastrointestinal Endoscopy (EPAGE) II guidelines on the appropriateness of colonoscopy use [10-11] consistently show 67%– 96% sensitivity and 13%– 40% specificity for the detection of relevant findings[6-9]. The proposed minimum standard of appropriate indication for colonoscopy ( ≥ 85 %) was based on values achieved in studies from academic and non-academic centers over 5 years [7,8,12]. The use of appropriate endoscopy reporting systems with a drop-down menu for indication is key to facilitate data acquisition for this performance measure [13].

## Supplementary material

### 1.6 **Rate of adequate bowel preparation**

**Statements**

▪ In patients suspected with IBD undergoing full colonoscopy, bowel preparation quality should be recorded using a validated scale with high intraobserver reliability.

▪ A service should have a minimum of ≥ 90 % procedures and a target of ≥95 % procedures with adequate bowel preparation, assessed using a validated scale with high intraobserver reliability.

Descriptive based evidence background :

A successful surveillance colonoscopy requires optimal bowel preparation[1]. This improves the detection of non-polypoid flat lesions that can be hidden by debris and stool[2].The rate of adequate bowel preparation is one of the key performance measures for ilio-colonoscopy as outlined by the ESGE guidelines [3], and the same can be applied to patients having diagnostic colonoscopy suspected to be IBD patients.

Due to the increased risk of bowel perforation, complete ileo-colonoscopy is not usually recommended in case of acute severe colitis [4]. ECCO guidelines in 2018 suggested that Flexible sigmoidoscopy can be safely performed to establish the diagnosis of UC [5] . Phosphate enema preparation before flexible sigmoidoscopy has been reported to be safe in this setting [6].

Restellini and colleagues[7] published a meta-analysis of bowel preparation in patients with IBD which showed equivalent efficacy of high and low volumes of PEG in split and non-split regimens, yielding improved patient tolerance for the low-volume regimen. These results have been con-firmed by two other studies[8,9].

A recent study[10] has shown that poor bowel preparation alongside inflammation or presence of pseudopolyps were the most frequent factors resulting in unsuccessful Chromoendoscopy.

Inadequate bowel preparation has a detrimental effect on all aspects of the colonoscopy procedure and, especially, on its accuracy. As pointed out in the ESGE guidelines on bowel preparation for colonoscopy [11] , the quality of bowel preparation is associated with two other important performance measures for colonoscopy, namely adenoma detection rate (ADR) cecal intubation rate[12]. Suboptimal bowel preparation results in further costs and inconvenience because the examination has to be repeated or an alternative examination has to be arranged [13].

## Supplementary material

Michal F. Kaminski et al stated that the a three bowel preparation scales have undergone comprehensive validation and have shown sufficient validity and reliability: the Boston Bowel Preparation Scale (BBPS) [14] , the Ottawa Scale [15], and the Aronchick Scale[16]. Therefore, adequate bowel preparation may be defined as: BBPS ≥ 6, Ottawa Scale ≤ 7, or Aronchick Scale excellent, good, or fair[3].

The adoption of validated scales for bowel preparation quality assessment has been proven to be feasible in routine practice[17]. The proposed minimum ( ≥ 90%) and target standard (≥ 95 %) rates of adequate bowel preparation were based on values reported in recent population-based studies[18-20] and on randomized clinical trials of split-dose bowel cleansing regimens[21-22], respectively.

  

## Supplementary material

### 1.7 Complication

Monitoring complication rates is essential to assess the safety of procedures, identify targets for improvement and allow reliable patient information.(1) General complication performance measures for colonoscopy are defined for heterogeneous populations, including IBD patients.(1) Nevertheless, patients with established IBD have a higher risk of endoscopy-associated perforation, compared to non-IBD patients.(2-4) There is scarce evidence on the complication risk in suspected IBD patients. The current evidence does not support an increased perforation risk in suspected IBD patients compared to non-IBD patients undergoing colonoscopy.(5) Therefore, general complication performance measures should be applied with regular standards in suspected IBD patients.

## Supplementary material

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### Ileal Intubation


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**Photodocumentation**

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## Supplementary material

**PICOs and summary of literature task force subgroup: Assessment of disease activity in known IBD**

**Members:** João Sabino, Laurent Peyrin-Biroulet, Mahmoud Omar, George Cortas, Marek Bugajski, Mark Löwenberg

PICO questions:

**2.1 Use of disease activity score (4.6)**

| | |
|---|---|
| Problem: | Objective tool to rate endoscopic disease activity |
| Patient: | CD (pre-, and postop), UC, and pouch |
| Intervention: | Developing endoscopic score, validation |
| Comparator: | Other endoscopic scores, descriptive report |
| Outcome: | Correlation with clinical score, relation with treatment course |

Note: take interobserver agreement into account.

**Who: Omar, Marek, Mark**

Statement:

ESGE recommends assessing Crohn's Disease and ulcerative colitis activity utilizing validated endoscopic activity scores: Simple Endoscopic Score for Crohn's Disease (SES-CD) or Crohn's Disease Endoscopic Index of Severity (CDEIS) for the whole colonoscopy extent in Crohn's disease; Ruutgert's Score after ileoceal resection in Crohn's disease; endoscopic Mayo score or Ulcerative Colitis Endoscopic Index of Severity (UCEIS) for ulcerative colitis; and the Pouchitis Disease Activity Index (PDAI) in patients with ileo-anal pouch anastomosis. The endoscopy report should explicitly include the used score.

**Supporting text**

Assessing disease activity to adjust therapy and mucosal healing as a therapeutic goal in patients with ulcerative colitis are important milestones in the management of ulcerative colitis. The use of endoscopic scoring systems of disease activity has been recommended by international guidelines to evaluate the prognosis and efficacy of medical treatment (Tontini et al., Expert Rev Gastroenterol Hepatol 2014;8:543-554). Nineteen different endoscopic scoring indices were partially validated (Mohammed Vashist et al., Cochrane Database of Systematic Reviews 2018). Among these, the most commonly used are Mayo Clinic Endoscopic Subscore and Ulcerative Colitis Endoscopic Index of Severity. Both have been validated for reliability, construct validity and responsiveness (Daperno et al., Gastroenterol 2014;146:S-234, Rubin et al., Am J Gastroenterol 2012;107:S694, Ikeya et al., J Crohns Colitis 2016;10:286-295, Travis et al., Gastroenterol 2013;145:987-995, De Jong et al., Inflamm Bowel Dis 2019;25:937-944 and Levesque et al., Gasteroenterol 2014;146:S-226-S-227). The operating properties of both scores are comparable, however, because the Mayo Clinic Endoscopic Subscore is easier to use, it remains the outcome of choice for both clinical trials and practice (Khanna et al., Clin Gastroenterol Hepatol 2021; in press).

In clinical practice, rectosigmoidoscopy should be sufficient in evaluating adult patients with new symptoms. If rectosigmoidoscopy has shown endoscopic healing in presence of symptoms, colonoscopy is justified (Colombel et al., Gastroenterol 2016;150:389-395).

## Supplementary material

On the other hand, these scores were criticized by being based on the assessment of most severely involved colonic segment and does not take into account the extent of ulcerative colitis involvement (Lobaton et al., J Crohns Colitis 2015;9:846-852). The segmental assessment of disease activity was developed as modified Mayo endoscopic score but not commonly implemented in trials as well as practice (Khanna et al., Clin Gastroenterol Hepatol 2021; in press).

Electronic chromoendoscopy-based score as Paddington International Virtual Chromoendoscopy Score (PICaSSO) requires more real-life, treatment-related studies for full establishment in both clinical practice and clinical trials (Iacucci et al., Gastroenterol 2021;160:1558-69).

Recently, artificial intelligence and deep learning have been shown to predict histologic remission and patient prognosis (Takenaka et al., Gastroenterol 2020;158:2150-2157 and Takenaka et al., Gastroenterol 2021;160:2175-2177).

### 2.2 Patient tolerance & sedation (3.5, n = 3)

General measure, not specific for disease activity, to be included in introduction.

### 2.3 Indication (2.9)

| | |
|---|---|
| Problem: | Timing of colonoscopy, assessment during flare, assessment during therapy |
| Procedure: | Colonoscopy, sigmoidoscopy, pouchoscopy |
| Intervention: | Reporting the indication |
| Comparator: | No information |
| Outcome: | Rate of colonoscopy reports with proper indication |

**Who: João**

Statement:

The endoscopy (colonoscopy, sigmoidoscopy, or pouchoscopy) report should include the indication for the procedure.

Literature:


- Performance measures for lower gastrointestinal endoscopy: a European Society of Gastrointestinal Endoscopy (ESGE) Quality Improvement Initiative. Endoscopy. 2017 Apr;49(4):378-397
- Appropriateness and diagnostic yield of colonoscopy in the management of patients with ulcerative colitis: a prospective study in an open access endoscopy service. Inflamm Bowel Dis. 2008 Aug;14(8):1133-8
- Systematic review with meta-analysis: the appropriateness of colonoscopy increases the probability of relevant findings and cancer while reducing unnecessary exams. Aliment Pharmacol Ther. 2021; 53:22–32.
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## Supplementary material

To add in discussion:

- Timing follow-up endoscopy after detecting disease activity
    - Evaluation of disease activity before start therapy
    - Evaluation of disease activity after start therapy
    - Evaluation of disease activity before surgery
    - Evaluation of disease activity after surgery
    - Follow up on severe disease
    - Follow up on active disease
- ESGE performance measurements for lower GI endoscopy already mentions indication as quality indicator
- Categories? Not according to EPAGE II as it does not recognize the importance of mucosal healing.

### 2.4 Adequate bowel preparation (2.8)

| | |
|---|---|
| Problem: | Need for adequate mucosa visualisation |
| Intervention: | Reporting of bowel preparation, score to use |
| Procedure: | Colonoscopy, sigmoidoscopy, pouchoscopy |
| Comparator: | No score used, descriptive report |
| Outcome: | Proper assessment of disease activity, allow use of disease activity score |

Note: Explicitly include sigmoidoscopy and pouchoscopy.

**Who: George**

***Statement:***

- The endoscopy (colonoscopy, sigmoidoscopy, or pouchoscopy) report should include the adequacy of the bowel preparation utilizing a score

***Introduction:***

- ESGE recommends high volume or low volume PEG-based bowel preparation in patients with inflammatory bowel disease (IBD). ***Strong recommendation, high quality evidence,*** (Hassan C, 2019).
- No studies were found that looked specifically at **scoring of the bowel preparation in IBD patients.**
- The most well established and commonly used validated bowel preparation quality scales in clinical trials include the, (Kastenberg D, 2018):
    - Aronchick Scale
    - Boston Bowel Preparation Scale (BBPS), (Lai EJ, 2009):
        - *The (BBPS) scale, a 10-point scale that assesses bowel preparation after the endoscopist's cleansing maneuvers, demonstrated good intraobserver and interobserver reliability and was favorably associated with clinical outcomes such as:*

## Supplementary material

- *Polyp-detection rates*
- *Recommendations for repeated procedures*
- *Colonoscope insertion and withdrawal times.*

  - Ottawa Bowel Preparation Scale (OBPS)

- ***Inflammatory bowel disease***
  - Complete and good quality mucosal visualization by colonoscopy with intubation of the ileum along with segmental mucosal biopsies is the most valuable tool to [4-9]:
    - Distinguish different types of inflammatory bowel disease (IBD)
    - Differentiate IBD from other intestinal disorders
    - Determining prognosis and the appropriateness of therapies
    - Along with diagnosis and treatment of complications
  - There have ***not*** been adequate studies to:
    - Determine the best ways to prepare IBD patients for colonoscopy
    - Identify safety issues associated with different approaches

***Literature:***


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### 2.5 Biopsies taken (2.7)

| | |
|---|---|
| Problem: | Evaluation of histologic activity |
| Patient: | UC |
| Intervention: | Obtain biopsies |
| Comparator: | No biopsies |
| Outcome: | Assessment of histologic disease activity, correlation with clinical score, relation with treatment course |

**Who: João**

Statements:

- In patients with ulcerative colitis, colon biopsies should be taken for confirm presence or absence of histologic disease activity.

Literature search:

- Histologic scoring indices for evaluation of disease activity in Crohn's disease. Cochrane Database Syst Rev . 2017 Jul 21;7(7):CD012351.
- Histologic scoring indices for evaluation of disease activity in ulcerative colitis. Cochrane Database Syst Rev. 2017 May 25;5(5):CD011256.
- Histologic improvements have been linked with improved clinical outcomes, such as a reduced risk of relapse and need for surgery/hospitalization and a reduced risk of developing cancer.
    - Histologic Remission: The Ultimate Therapeutic Goal in Ulcerative Colitis? "Clinical Gastroenterology and Hepatology 2014;12:929–934
- Transmural healing in Crohn's disease and histological healing in ulcerative colitis are not formal targets but should be assessed as measures of the remission depth.
    - STRIDE-II: An Update on the Selecting Therapeutic Targets in Inflammatory Bowel Disease (STRIDE) Initiative of the International Organization for the Study of IBD (IOIBD): Determining Therapeutic Goals for Treat-to-Target strategies in IBD. Gastroenterology 2021;160:1570–1583

## Supplementary material

### 2.6 Complications (2.7, n = 3)

General measure, not specific for disease activity, to be included in introduction.

Considerations: strictures, evaluation of rate of complications

Reasons to stop endoscopy during active disease (e.g. deep ulcers in UC).

### 2.7 Photo/video documentation (and adequate description)

| | |
|---|---|
| Problem: | Photo/video documentation |
| Patient: | CD/UC |
| Intervention: | Photo/video documentation |
| Comparator: | No photo/video documentation |
| Outcome: | Proper assessment of disease activity |

**Who: João**

Statement:

Procedures evaluating disease activity in patients with IBD should be recorded. In the case of ulcerative colitis, the full procedure should be recorded, including the introduction of the scope, as this has practical implications in determining the Mayo endoscopic subscore.

Supporting

- Low inter-observer agreement
    - Do You See What I See? An Assessment of Endoscopic Lesions Recognition and Description by Gastroenterology Trainees and Staff Physicians. Journal of the Canadian Association of Gastroenterology, 2020, 3(5), 216–221
    - Inter-observer agreement in endoscopic scoring systems: preliminary report of an ongoing study from the Italian Group for Inflammatory Bowel Disease (IG-IBD). Dig Liver Dis. 2014 Nov;46(11):969-73
- Systematic evaluation with standardized photos
    - GE Port J Gastroenterol 2017;24:269–274

# Supplementary material

**PICOs and summary of literature task force subgroup: Surveillance in longstanding IBD**

*NB. PICO tables are attached separately.*

**3.1 Bowel preparation (Marietta Iacucci)**

**P**: Patients with known long standing IBD colitis (in remission) going through surveillance endoscopy
**I** : Optimal bowel preparation ( BBPS>6)
Endoscopic remission MES=0 UCEIS<=1 PICaSSO<=3
**C** :fair-poor bowel preparation active disease
**O** Proportion of patients undergoing DCE/VCE
Dysplasia detection rate

**Statement: ESGE suggests to perform surveillance colonoscopy with adequate bowel preparation defined as BBPS ≥6, Ottawa Scale ≤7, or Aronchick Scale excellent, good, or fair *AND* with ulcerative colitis in endoscopic remission defined as MES=0 or UCEIS<=1 or PICaSSO<=3**
**ESGE recommends high-volume or low volume PEG based bowel preparation to clean the colon in IBD patients**

Current consensus guidelines recommend performing surveillance colonoscopy when IBD is in remission and with adequate bowel preparation; otherwise, it can be difficult to discriminate between dysplasia and inflammation on mucosal biopsies.[1,2]. Disease activity can also modify the appearance of the mucosa thus making the detection and interpretation, especially of the flat subtle dysplasia very difficult. In a recent study, insufficient bowel preparation alongside persistent disease activity or presence of pseudo-polyps were the most common reasons for Dye Chromoendoscopy (DCE) not being carried out [3,4].

However, few data have investigated which preparation regimens and minimum activity of disease are considered optimal when either DCE or Virtual Electronic Chromoendoscopy(VCE) is performed. Furthermore, there are not enough evidence yet to recommend a threshold of endoscopic remission and adequate bowel preparation in IBD patient. In a prospective observational study Megna et al [5] found that the majority of patients who were able to undergo DCE had a Boston Bowel Preparation Score (BBPS) of at least 7, suggesting that “good” or “excellent” bowel preparation is needed for a successful DCE examination. In addition, patient having clear fluid diet for 24 hours pre-procedure led to high odds of being able to undergo DCE (OR 0.11,95% CI 1-0.85; p<.034).
Limited comparative data are available for bowel preparation efficacy and tolerability in IBD colitis. A recent systematic review and meta-analysis of four fully published comparative studies showed that PEG low-volume regimen is not inferior to PEG high-volume to clean the colon and yields improved willingness-to repeat [6]. Similarly, others papers confirmed these data [7-10] and showed increased patients tolerability of low volume regimens [8,11-13].
A recent French prospective multicentre observational study [10] which enrolled 278 patients evaluated the efficacy, tolerability, and safety of different bowel preparations for patients with IBD, including low-volume preparations. The preparation tolerability and intake were complete for 59.5% in the PEG-4L group, compared with 82.9% in the PEG-2L group and 93.8% in the Pico group [p < 0.0001]. Preparations with PEG-2L and sodium picosulfate (Pico) were equally safe, with better efficacy and tolerability outcomes compared with PEG-4L preparations. However the best efficacy/tolerance/safety profile was achieved with the Pico preparation compared with PEG-2L [p = 0.008; p = 0.0003]. [10]
Few data explored an association between IBD disease activity and preparation quality. Hence there is no definitive proof that patients with IBD have an increased likelihood of inadequate bowel preparation. In a retrospective analysis of 348 colonoscopies from 169 IBD patients consecutively enrolled no difference in the quality of bowel preparation between patients with active disease and those with mucosal healing were found, suggesting that the efficacy of bowel preparation is not influenced by disease inflammation[14].

  

## Supplementary material

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### 3.2 Chromoendoscopy rate (Maria Pellise)

**P:** patient with known long standing IBD colitis in remission going through surveillance endoscopy.
**I:** WLE-HD
**C:** DCE/VCE
**O:** The percentage of the procedures the endoscopic technique (DCE or VCE) will be applied according to evidence

## Supplementary material

An endoscopic surveillance is required to prevent colorectal cancer in patients with long standing colonic inflammatory bowel disease (IBD), as in these populations have higher rates of dysplasia and CRC than general population [1,2]. For surveillance, actual guidelines recommend a high-quality procedure in absence of active disease and with an adequate bowel preparation given that poor bowel preparation and inflammation with presence of pseudopolyps were predicting factors of unsuccessful dye-based pan-chromoendoscopy (DCE)[3].

**High definition versus dye based chromoendoscopy (DCE).**

Guidelines recommends DCE with indigo carmine or methylene blue as the standard for dysplasia surveillance in longstanding colitis because of the proven superiority over standard white light endoscopy[4–6]. However, with the emergence of high-definition white light endoscopy (HD-WLE) and its proven superiority over standard definition white light endoscopy (SD-WLE) in other populations, the usefulness of DCE in the surveillance of long standing IBD colitis when compared with HD-WLE has been questioned.

In this context, several studies have compared the efficacy between DCE and HD- WLE for detection of dysplasia in patients with IBD. **Systematic reviews and meta-analysis of randomized control trials (RCT) have assessed this comparison and found no significant differences in detection of dysplasia and neoplasia between the two groups[7,8] (Table 1**). Only one meta-analysis involving 6 RCT and 5 prospective studies found discordant results, showing that DCE is superior to HD-WLE in the surveillance of dysplasia in IBD patients[9].

**Virtual chromoendoscopy versus High-definition white light endoscopy.**

Virtual chromoendoscopy (VCE) uses light properties and/or image processing to enhance the vascular pattern of the mucosa, highlighting mucosal lesions. The most widely studied in these population have been narrow band imaging (NBI) and i-SCAN. **Results from a systematic review including 11 trials have shown that VCE have no significant differences when compared to HD-WLE for dysplasia detection in a per patient and per lesion analysis.**[10,11].

The summary of evidence is in **table 2.**

**Dye based chromoendoscopy versus virtual chromoendoscopy.**

VCE has emerged as an attractive alternative to overcome the laboriousness of DCE. The actual evidence shows no significant difference between the two techniques for dysplasia detection. In a systematic review and metanalysis involving 2457 patients from 17 RCT compared different endoscopic methods for surveillance of dysplasia in IBD found no significant differences was observed between DCE and VCE - including NBI, i-SCAN and FICE, in all outcomes except procedure time[12].

Bisschops R. et al in a multicenter prospective RCT with 131 patients compared DCE with methylene blue (0.1%) and VCE with NBI for detection of neoplastic lesions in long standing colitis finding no significant differences between both groups.

El-Dallal M et al. in a systematic review comparing VCE (NBI and I-SCAN) versus HD-WLE and DCE. When comparing DCE vs- VCE found in a per patient analysis that VCE was not difference to DCE for dysplasia (7 RCT with 529 patients)[13] **(Table 3)**

**Recommendation:** Given the actual evidence, we recommend the spread use of HD-WLE (at least in the 90% of the procedures) for dysplasia surveillance in patients with long standing colitis. DCE have to be applied when HD-WLE is not available, given the proven superiority over SD-WLE.

Several trials show an advantage of VCE towards HD-WLE without consistent statistical significance. According to availability and experience the use of VCE is recommended. There is no evidence to recommend a threshold.

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**3.3 Random, Targeted High risk patients PICO (James East)**

- **P**: Patients with known longstanding IBD colitis (in remission) going through surveillance endoscopy
- **I** :Random biopsy sampling WL
- **C**:Target biopsy sampling with DCE VCE/HD
- **O**: Proportion of patient had target biopsies taken

  

## Supplementary material

**Statements**

ESGE suggests that in patients with IBD colitis in remission, when using dye-based or virtual chromoendoscopy for dysplasia surveillance, targeted biopsies *only* should be used at least 80% of the time (weak recommendation, low quality of evidence)

This statement assumes 20% [this could be varied] of the cases = high-risk patients with history of colonic neoplasia, tubular-appearing colon, strictures, ongoing therapy-refractory inflammation, or primary sclerosing cholangitis. By setting an approximate proportion of high risk cases it makes the quality measure easier to calculate.

**Accompanying text**

Historically endoscopists using standard definition white light endoscopy for surveillance in colitis were recommended to take quadrantic biopsies every 10cm of the colon or a minimum of 33 biopsies [AGA, BSG, ESGE?]. As this samples on 0.03% of the colonic surface it was unsurprisingly not very effective, and few gastroenterologists complied. In one UK audit, the mean number of biopsies was 14 [Elsadani N Gut; however since 2010 dye-based chromoendoscopy for IBD surveillance has been recommended by multiple international guidelines [BSG Rutter, ESGE, ECCO, SCENIC] and more recently virtual chromoendoscopy as well [Bisschops Endoscopy ESGE 2019]. As well as the use of dye, targeted biopsies only are recommended once the learning curve has been surmounted [Dekker E Optical Dx curriculum Endoscopy 2020]. Nevertheless in a recent survey among international IBD specialists, 43% of respondents stated that they perform non-targeted colonic biopsies in >75% of cases when performing chromoendoscopy for IBD surveillance.[Kaltenbach GIE 2017]

Numerous academic studies, predominantly at tertiary centres, have demonstrated the almost negligible yield of non-targeted biopsies, which make a very significant workload for endoscopist to acquire the tissue, which could be spent on careful inspections, and for pathologists to report it [Rutter MD et al. Gut 2004, Hlavaty T et al. Eur J Gastroenterol 2011, Gasia MF et al. Clin Gastro Hepat 2016, Kandiah K et Gut 2020]. The value of continuing quadrantic biopsies both in terms of effort and cost has been questioned as the yield is so low compared to targeted approaches, both on a dysplasia detected per patient and dysplasia detected per sample basis.

However a large community based study on chromoendoscopy from the French GETAID suggested that for certain high risk subsets of IBD patients, quadrantic or random biopsies may still have a role. In 82 patients, neoplasia was detected from targeted biopsies or removed lesions, and among them dysplasia was detected also by random biopsies in 7 patients. Importantly, in 12 additional patients dysplasia was only detected by random biopsies. Overall, 140 neoplastic sites were found in 94 patients, 112 (80%) from targeted biopsies or removed lesions and 28 (20%) by random biopsies. The yield of neoplasia by random biopsies only was 0.2% per-biopsy (68/31 865), 1.2% per-colonoscopy (12/1000) but 12.8% per-patient with neoplasia (12/94). Dysplasia detected by random biopsies was associated with a personal history of neoplasia, a tubular appearing colon and the presence of primary sclerosing cholangitis (PSC) [Moussata D Gut 2018].A subsequent retrospective study in patients with dysplasia examined with chromoendoscopy or high definition white light, of 400 colonoscopies where dysplasia was detected, 362 colonoscopies (82%) had only visible dysplasia, 52 (12%) had only dysplasia detected by random biopsy, and 28 (6%) had both visible and random biopsy detected dysplasia. Longer disease duration (odds ratio, 1.04; 95% CI, 1.01-1.07), active inflammation (odds ratio, 2.89; 95% CI, 1.26-6.67), and concomitant PSC (odds ratio, 3.66; 95% CI, 1.21-11.08) were associated with detecting dysplasia on random biopsies compared with visible lesions. [Anne B Hu, IBD 2021]

## Supplementary material

Therefore when using chromoendoscopy for IBD surveillance, the use targeted biopsies only, by appropriate trained endoscopists, for patients in remission, is recommended as an easily measured quality indicator that the endoscopist is focussing effort on inspection, and minimising pathological cost and workload. As higher risk cases described above, where quadrantic biopsies may be taken in addition, are rare, especially in community practice, a minimum level of 80% of cases where targeted biopsy only are recommended is defined to optimise ease of calculation of this metric.

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## Supplementary material

### 3.4 Neoplasia detection rate (John Gasdal Karstensen and Helmut Neumann)

- **P:** Patients with known longstanding IBD colitis (in remission) going through surveillance endoscopy
- **I:** Dysplasia detection rate >10 % based on the ESGE curriculum
- **C:** Dysplasia detection <10%
- **O:** Reduction of Colorectal Cancer

Patients with longstanding IBD colitis are at increased risk of developing colorectal cancer with an estimated risk of approximately 18% after 30 years with the diagnosis (Gillen et al, Gut, 1994 & Friedman S et al, CG, 2008). Consequently, patients are recommended to undergo screening colonoscopies aiming at detecting premalignant dysplastic lesions (Maaser et al, JCC & 2018 Laine et al, GIE, 2015). While the correlation between adenoma detection rate (ADR) and risk of developing interval cancers is solid in a screening population, it is still debatable in IBD. However, applying a neoplasia detection rate as a quality measure is reasonable and therefor it has been incorporated in the ESGE curriculum for optical diagnoses (Dekker et al, Endoscopy, 2020). As the detection rate with dye spray chromoendoscopy is approximately 15%, a recommended threshold for neoplasia detection rate is suggested at 10% (Carballal S et al, Gut, 2018). The performance measure might be influenced by several factors including ongoing inflammation and extensive presence of inflammatory polyps. The ability to discriminate lesions by endoscopic description and characterization might also be challenging compared to non-IBD cases. Furthermore, the incidence of IBD related cancer might differ between countries and is in addition, affected by the threshold for colectomy (Weimers P et al, IBD, 2021 & Lutgens MWMD et al, IBD, 2014). This recommendation is therefor only valid in patients in remission without extensive presence of inflammatory polyps and colon *in situ*, but both cases with ulcerative colitis and Crohn´s colitis can be included.

Recommendation:

The ESGE recommends surveillance endoscopy in patients with long-standing ulcerative colitis or Crohn´s colitis using dye chromo endoscopy with targeted biopsies only.

The ESGE supports a quality measure of ≥ 10% for dysplasia detection rate for physicians carrying out these surveillance endoscopies.