

# Quality Indicators of Colonoscopy: A Study of 150 Patients

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## ABSTRACT

**Background:** Colonoscopy is the most effective method for detecting and preventing colorectal cancer (CRC). Its diagnostic success is strongly tied to bowel preparation quality and performance metrics such as adenoma detection rate (ADR). Poor preparation leads to missed lesions, prolonged procedures, and higher repeat-colonoscopy rates, making quality monitoring essential.

**Objectives:** This study evaluated colonoscopy performance indicators specifically bowel-prep quality and ADR among patients undergoing screening, surveillance, and diagnostic colonoscopies. It also assessed how patient comorbidities, lesion distribution, and histopathology influenced detection outcomes.

**Methods:** A retrospective quality improvement (QI) review of 150 colonoscopies was performed at Mercy Fitzgerald Hospital between January and April 2022. Data were extracted from endoscopy and pathology reports, including ASA classification, bowel preparation quality, lesion characteristics, and recommended follow-up. Descriptive analysis was conducted using SPSS v27.

**Results:** Most patients were ASA II or III, with a mean age of 61 years. An exceptional ADR of 88% was observed, far surpassing typical organizational benchmarks (25–30%). Tubular adenomas were the most common finding. Good bowel preparation yielded the highest lesion-detection efficiency, while excellent prep improved visualization but did not significantly increase polyp counts. Fair or poor prep was more frequent among patients with higher ASA classifications.

**Conclusion:** While ADR was exceptionally high, bowel prep quality especially among medically complex patients remains an area for targeted improvement. Enhanced preparation strategies, individualized regimens, and patient education could improve visualization, reduce missed lesions, and align performance with national guidelines.

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## INTRODUCTION

Colorectal cancer is a major contributor to global cancer morbidity and mortality. Colonoscopy plays a critical role in early detection and prevention by allowing direct visualization of the mucosa and enabling removal of premalignant polyps [1]. Its effectiveness depends on multiple factors, but bowel preparation quality is one of the strongest determinants of diagnostic accuracy.

Inadequate bowel cleansing decreases mucosal visibility and increases the likelihood of missed lesions, incomplete procedures, and shorter surveillance intervals placing a burden on both the healthcare system and patients [12]. Prior research suggests that a significant proportion of interval cancers arise due to missed lesions or inadequate prep [13,15].

Multiple bowel-prep strategies exist, including polyethylene

glycol (PEG) solutions, sodium phosphate, low-residue diets, and adjunctive agents. Evidence increasingly supports split-dose regimens, low-volume PEG with enhancers, and individualized prep plans for patients with comorbidities [5–9]. To measure prep quality, validated scoring tools such as the Boston Bowel Preparation Scale (BBPS) are widely used [2].

Adenoma detection rate (ADR) is another key quality indicator. Higher ADRs correlate closely with lower rates of interval colorectal cancer, making adherence to ADR benchmarks fundamental for endoscopist assessment and institutional quality monitoring [10]. Surveillance intervals after polypectomy are guided by US Multi-Society Task Force (USMSTF) recommendations, which depend on the number, size, and histology of detected lesions [11].

This study examines colonoscopy quality performance at a community hospital by analyzing bowel preparation, ADR, lesion characteristics, and compliance with evidence-based surveillance recommendations.

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## METHODS

### Study design and setting

This retrospective QI study was conducted at Mercy Fitzgerald Hospital, a community-based facility with an active outpatient endoscopy unit. The hospital serves a mixed urban-suburban population with a wide range of comorbid conditions. This QI activity was conducted according to internal standards and required no IRB approval under institutional policy [3].

### Study population

The study involved 150 consecutive patients undergoing colonoscopy for:

1. Routine screening,
2. Post-polypectomy surveillance,
3. Or diagnostic evaluation for gastrointestinal symptoms.

Exclusion criteria were:

- Incomplete colonoscopy (failure to reach the cecum),
- Unviewable colon due to severely poor preparation,
- Missing pathology data.

The sample represented real-world clinical diversity, including patients with multiple comorbidities and high ASA classifications.

### Data collection and variables

Data were extracted from electronic medical records, colonoscopy reports, and pathology results. Variables included:

- Demographic data (age, sex),
- ASA physical status,
- Colonoscopy indication,
- Bowel-prep quality (poor, fair, good, excellent),
- Caecal intubation documentation,
- Lesion number, size, and anatomical distribution,
- Histology (adenoma type, dysplasia grade).

Two independent reviewers checked all data to ensure accuracy and reduce extraction errors [2].

### Procedure protocol

Patients were instructed to follow a 1–3-day low-residue diet. Prep solutions included PEG-based regimens, sodium phosphate, or low-volume PEG with adjuncts such as simethicone, olive oil, or ascorbic acid depending on physician preference [5–9]. Split dosing was encouraged for morning procedures.

Sedation followed ASA fasting guidelines and typically included midazolam with fentanyl or propofol infusion when appropriate [14]. Vital signs were continuously monitored. Cecal intubation was confirmed by visualizing anatomic landmarks.

Minimum withdrawal times of six minutes were maintained for non-polypectomy examinations to ensure adequate mucosal inspection. Lesions were resected or biopsied and submitted for histopathology analysis [13].

### Histopathology

Resected specimens were analyzed for adenoma subtype (tubular, tubulovillous, villous), hyperplastic changes, inflammatory pathology, or malignancy. Dysplasia grading

followed institutional standards and widely accepted classification guidelines [13].

### Statistical analysis

Descriptive statistical analysis was performed using IBM SPSS v27. Continuous variables were expressed as means and standard deviations, and categorical variables as counts and percentages. ADR was defined as the proportion of colonoscopies identifying at least one adenoma. Associations between ASA classification, preparation quality, and lesion detection were described qualitatively to guide QI initiatives [3,16].

## RESULTS

### Patient demographics

Of the 150 patients, 86 (57%) were female and 64 (43%) male, with a mean age of 61 years. ASA classifications were:

- ASA II: 39%
- ASA III: 58%
- ASA I/IV: 3%

Screening accounted for nearly half the procedures, while the remainder were surveillance or diagnostic evaluations.

### Bowel preparation quality

Preparation scores at the start of each procedure were:

- Good: 45%
- Fair: 31%
- Excellent: 16%
- Poor: 8%

Lavaging improved visualization in many poor cases, enabling adequate inspection. Higher ASA scores correlated strongly with poorer initial prep, likely due to medication burden, limited mobility, or intolerance of full-volume solutions [16].

### Adenoma detection rate and lesion types

Of the 150 colonoscopies, 129 identified at least one adenoma, yielding an ADR of 88% markedly above recommended thresholds. Lesion distribution included:

- Tubular adenomas: 51%
- Tubulovillous adenomas: 7%
- Hyperplastic polyps: 39%
- Hemorrhoids: 69%
- Inflammatory lesions: 3%
- Rare benign lesions: <2%

Polyp localization favored the sigmoid (distal colon) and transverse colon, consistent with other population studies [4].

### Relationship between prep quality and detection

Good preparation produced the highest detection efficiency. Although excellent prep provided the clearest visualization, the number of polyps detected did not substantially exceed those with good prep. Poor prep required extensive lavage, increased withdrawal time, and risked missing flat or right-sided lesions, consistent with prior literature showing increased adenoma miss rate in inadequate prep [12,15].

### Follow-up recommendations

Follow-up intervals followed USMSTF recommendations [11]:

- Single small tubular adenoma: 3 years
- Multiple adenomas / high-grade dysplasia: 1 year
- Incomplete polypectomy: early repeat within weeks to months
- Inflammatory findings: clinical follow-up within 3–6 months

Patients with high-risk lesions were enrolled in early surveillance schedules.

## DISCUSSION

### Interpretation of the exceptionally high ADR

ADR is a powerful predictor of interval CRC risk [10]. The 88% ADR in this study is significantly higher than standard expectations. This may reflect:

- A mixed population with many surveillance cases,
- Experienced endoscopists with strong withdrawal technique,
- Effective use of photographic documentation,
- Institutional culture emphasizing completeness and accuracy [1,4].

While this reflects high-quality practice, ADR must always be interpreted in context of case mix.

### Bowel preparation as a modifiable quality factor

Poor bowel preparation is consistently linked to missed adenomas, incomplete exams, prolonged procedures, and shortened follow-up intervals [12]. Improving prep quality especially among high-ASA patients can significantly improve detection rates. Interventions supported by literature include:

- Split-dose regimens,
- Low-volume PEG with adjuvants,
- Personalized prep plans for comorbid patients,
- Low-residue diets instead of clear-liquid diets [5–9].

These strategies can improve tolerability and cleansing effectiveness and reduce the need for early repeat procedures.

### Patient education and communication

Quality outcomes strongly depend on patient adherence to preparation instructions. Research shows that verbal counseling, written instructions, and telephone reminders significantly increase prep adequacy [16]. Multifaceted education is especially crucial for patients with mobility limitations, older adults, or those taking multiple medications.

### Implications for surveillance and long-term cancer prevention

Proper interval timing reduces the risk of interval cancers. Incomplete or partial polypectomy is a known source of recurrence; some studies find residual neoplasia in up to 17% of large sessile lesions [15]. Early repeat colonoscopy when margins are uncertain, combined with preventive strategies (aspirin, NSAIDs, dietary modification), may reduce recurrence risk [15].

### Quality improvement recommendations

To sustain and improve performance, the following QI measures are suggested:

- Standardized prep algorithms including low-volume and

- split-dose options,
- Targeted prep modifications for high-ASA patients,
- Continuous tracking of ADR, cecal intubation rate, and prep quality,
- Regular performance feedback to endoscopists,
- Patient-friendly educational materials and reminder calls.

These initiatives can improve prep quality and reduce variability in colonoscopy performance over time [1,5,16].

## CONCLUSION

This retrospective QI study highlights strong colonoscopy performance at a community hospital, demonstrated by an ADR of 88%, well above established quality benchmarks. Nevertheless, bowel-prep quality especially among medically complex patients remains a limiting factor. Personalized preparation protocols, enhanced education, and consistent adherence to surveillance guidelines are essential to improve overall outcomes.

Ongoing data tracking, performance feedback, and patient-centered strategies will help maintain high-quality colonoscopy practices and reduce missed lesions and interval cancers [5,9,11,16].

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