Enhancing Colonoscopy Quality: Evaluating Adherence to Performance Measures in Ukraine

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DOI https://doi.org/10.1200/GO-25-00390

ABSTRACT

PURPOSE Colonoscopy is a proven screening method for reducing mortality from colorectal cancer (CRC), the most frequently diagnosed cancer in Ukraine. To enhance colonoscopy quality, international societies have defined key performance measures (PMs). We aimed to evaluate adherence to these PMs among Ukrainian endoscopists and explore factors affecting screening colonoscopy quality.

METHODS We conducted a cross-sectional study using a web-based survey among members of Ukraine's endoscopy society EndoAcademy (Kyiv, Ukraine) (October-November 2023). The questionnaire assessed colonoscopy practices and adherence to globally recognized PMs, categorized as six calculated (requiring ongoing numerical data tracking) and six noncalculated (performed/not performed practices).

RESULTS Of 540 invited endoscopists, 122 (22.6%) responded. The median number of adhered to quality PMs was 6 (IQR, 5-8), with noncalculated being reported more frequently: medians 4 (IQR, 4-5) versus 2 (IQR, 1-3), $P < .01$. Among noncalculated PMs, most common were postpolypectomy surveillance recommendations (98.4%, n = 120) and retrieval of removed polyps (96.7%, n = 118). For calculated PMs, cecal intubation (61.5%, n = 75) and adenoma detection (59.8%, n = 73) rates were most frequently reported. In multivariable analysis, adherence to each additional quality PM increased the odds of optimal polyp treatment (odds ratio [OR], 1.32 [95% CI, 1.03 to 1.70]), with photo/video recording (OR, 7.57 [95% CI, 1.66 to 34.49]) and adequate procedure time allocation (OR, 3.86 [95% CI, 1.18 to 12.61]) showing the strongest associations.

CONCLUSION To our knowledge, this first national study of colonoscopy PMs in Ukraine highlights key documentation gaps and variation in polyp management. As the country implements a population-based CRC screening program, structured quality assurance, audit-and-feedback systems, and education grounded in international PMs will be critical to improving outcomes.

ACCOMPANYING CONTENT

- Data Sharing Statement
- Data Supplement
- Reflexivity Statement

Accepted September 11, 2025
Published October 29, 2025

JCO Global Oncol 11:e2500390

INTRODUCTION

Ukraine is a lower-middle-income country (LMIC) facing a significant burden of colorectal cancer (CRC), which accounted for 20,877 new cases and 11,263 deaths in 2022, making it the most commonly diagnosed cancer in the country.[1,2] Screening colonoscopy effectively reduces CRC-related morbidity and mortality by detecting early neoplasia and removing precancerous lesions.[3] However, despite advancements in endoscopic technologies, the rate of missed lesions and interval cancers remains substantial.[4] To address these challenges and optimize the effectiveness and consistency of colonoscopy, the European Society of Gastrointestinal Endoscopy (ESGE) and the American Society for Gastrointestinal Endoscopy (ASGE) have identified key quality performance measures (PMs).[5,6] Adherence to them has been associated with improved adenoma detection rate (ADR)—a critical benchmark inversely related to the interval CRC incidence and mortality.[7,8] Other PMs also contribute to enhanced procedure safety, patient experience, and reduced need for repeat procedures.[9] Collectively, these measures aim to strengthen both diagnostic and therapeutic outcomes of colonoscopy and ultimately improve CRC control.

CONTEXT

Key Objective

How well do Ukrainian endoscopists adhere to international performance measures (PMs) for screening colonoscopy, and what factors influence procedural quality?

Knowledge Generated

To our knowledge, this first national survey among 122 Ukrainian endoscopists revealed high adherence to noncalculated PMs (eg, postpolypectomy surveillance recommendations, retrieval of removed polyps), while calculated PMs, requiring regular tracking (eg, adenoma detection rate, complication rate), were reported less frequently. About one third of respondents reported suboptimal management of detected polyps. Notably, adherence to each additional PM was associated with an increase in the odds of optimal polyp treatment, with photo/video recording and adequate procedure time allocation, emerging as most significant PMs.

Relevance

These findings reveal critical documentation and practice gaps that must be addressed as Ukraine launches a national colorectal cancer screening program. Integrating international quality standards into training and ensuring adherence in clinical practice may improve patient outcomes in Ukraine and countries with similar settings.

In Ukraine, screening practices are evolving. Our previous study found that 75% of primary care physicians in Ukraine use colonoscopy referrals as an opportunistic screening method.[10] Another publication demonstrated that performing colonoscopy every 10 years was more cost-effective than no screening.[11] Responding to the high national burden of CRC, the Ministry of Health of Ukraine issued Order No. 1368 on August 5, 2024, establishing the framework for a national, population-based CRC screening program.[12] This program uses the fecal immunochemical test (FIT) as the primary screening modality, with colonoscopy as a follow-up test after positive FIT results.[13] In this context, high-quality colonoscopy is essential to the program's success and requires structured quality assurance based on internationally recognized PMs. However, Ukraine currently lacks both a national quality assurance framework and digital infrastructure for automatic calculation and monitoring of PMs.

Despite global advances, efforts to assess colonoscopy quality in LMICs remain limited. Although high-income countries, such as Italy and Spain, have extensively studied adherence to PMs,[14–16] LMICs, including Ukraine, continue to face critical data gaps. In particular, little is known about how polyps are detected and managed during screening colonoscopies in these settings.[17] In Ukraine, the absence of standardized documentation of procedure indicators further hinders quality assurance and implementation efforts.[18] This study aimed to evaluate adherence to endoscopy PMs among Ukrainian endoscopists, examine factors affecting screening colonoscopy, and identify causes of suboptimal polyp management. These insights are critical for strengthening colonoscopy quality, informing the rollout of the national CRC screening program, and ultimately improving population-level cancer outcomes in Ukraine and other LMICs.

METHODS

Study Design and Target Population

We conducted a cross-sectional study using a web-based self-administered survey of Ukrainian endoscopists who routinely perform CRC screening colonoscopies, aiming to evaluate adherence to colonoscopy PMs and identify factors affecting procedural quality. The study follows the Checklist for Reporting Results of Internet E-Surveys.[19]

Survey Development

The questionnaire was developed on the basis of colonoscopy quality PMs outlined in the ESGE and ASGE guidelines.[5,6] All proposed PMs were reviewed by our research team and assessed for relevance and feasibility within the Ukrainian health care context. Measures that were not applicable or routinely collected in Ukraine were excluded. Owing to the absence of software for automatic calculation of PMs, Ukrainian endoscopists are expected to manually track and compute their performance indicators. To account for this in our study design, we categorized the selected PMs as either calculated or noncalculated. Calculated PMs require the ongoing collection and analysis of numerical data (eg, detection rates or complication rates), whereas noncalculated PMs involve procedural practices that can be assessed as either performed or not performed. Thus, the final set included 12 PMs: six noncalculated (surveillance recommendations, removed polyp retrieval, photo/video recordings, time allocation for the procedure, withdrawal time, and

endoscopic tattooing) and six calculated (rate of adequate bowel preparation, cecal intubation rate, ADR, polyp detection rate, sessile serrated lesion detection rate, and complication rate). The survey consisted of 30 questions divided into three sections: seven questions on demographic and professional characteristics, 19 on adherence to colonoscopy PMs, and four on perceived barriers to screening colonoscopy in Ukraine (Data Supplement, File S1). Optimal adherence to quality PMs was defined as selecting always or frequently on a Likert scale for applicable questions.

Survey Testing and Administration

Before launch, the survey instrument was pilot-tested by four volunteer endoscopists from private clinics in Ukraine who routinely perform screening colonoscopies. They evaluated the clarity, logical flow, and functionality of the instrument. None of the pilot testers were part of the research team or final study cohort.

The finalized questionnaire was translated into Ukrainian and reviewed by a multidisciplinary team of Ukrainian physicians, including endoscopists, colorectal surgeons, and surgical and medical oncologists (Data Supplement, File S2). The survey was programmed using SurveyMonkey (SurveyMonkey Inc, San Mateo, CA[20]) and distributed via email to members of EndoAcademy (Kyiv, Ukraine)—one of Ukraine's largest professional endoscopy societies.[21] To expand outreach, a recruitment post was also shared in the EndoAcademy Facebook group. This was an open survey accessible via a direct link. It remained open for responses from October 06, 2023, to November 12, 2023, and participants completed it independently.

SurveyMonkey's default settings allowed for tracking via cookies and intraperitoneal addresses to prevent multiple entries. Participants could navigate freely through the survey and review or modify their responses before submission. The platform did not enforce completion; partial responses could be submitted. No log file analysis was conducted, and no technical issues were reported during pilot or full deployment.

Ethics

Ethical approval was obtained from the Institutional Review Board of the National Cancer Institute in Kyiv, Ukraine, on September 17, 2023 (IRB approval no.: 245/4). Participation was voluntary, and electronic informed consent was obtained via a required checkbox before survey access. No personally identifying information was collected. Responses were anonymous and stored on a password-protected device accessible only to the designated data analyst. No incentives were offered.

Data Analysis

In compliance with the American Association of Public Opinion Research guidelines, a survey was considered complete when >80% of the questions were answered. Incomplete questionnaires were excluded. Categorical variables were reported as frequencies (n) and proportions (%), and continuous variables as medians with IQR. We conducted logistic regression analysis to identify factors associated with optimal detected polyp management, defined as polyp removal during the same procedure. Univariable logistic regression was used to examine the association between nonadherence to any of the six calculated PMs and optimal polyp management. For all other analyses, covariate selection was performed using cross-validated lasso logistic regression, chosen for its ability to reduce overfitting and handle collinearity in modest sample sizes. Factors retained by lasso were subsequently entered into a standard multivariable logistic regression model to obtain odds ratios (ORs) with 95% CI. Statistical analysis was conducted with a prespecified level of significance <.05 using Stata BE v.19 (StataCorp LLC; College Station, TX).

RESULTS

The survey was distributed to 540 endoscopists, yielding 122 responses—a response rate of 22.6%. All included responses met the predefined threshold of >80% completion. The majority of respondents were male—89 (73.0%; Table 1). Participants represented hospitals across Ukraine, with nearly all regions included except for Russia-occupied territories, with most located in Kyiv and North Ukraine (44.3%, n = 54). Most respondents worked in public hospitals (59.8%, n = 73) and reported performing over 300 colonoscopies annually (41.8%, n = 51).

The median number of adhered colonoscopy quality PMs was 6 (IQR, 5-8), with noncalculated PMs being reported significantly more frequently than calculated: medians 4 (IQR, 4-5) versus 2 (IQR, 1-3); $P < .01$. Among noncalculated PMs, the most commonly reported were postpolypectomy surveillance recommendations (98.4%, n = 120), retrieval of removed polyps (96.7%, n = 118), photo/video recording (89.3%, n = 109), and allocation of adequate time for the procedure (83.6%, n = 102; Fig 1A). For calculated PMs, the cecal intubation rate (61.5%, n = 75) and ADR (59.8%, n = 73) were the most frequently reported (Fig 1B).

Optimal management of detected polyps, defined as endoscopic polypectomy during the same procedure, was reported by 68.9% (n = 84) of respondents. Other management approaches included biopsy followed by removal during a separate colonoscopy (16.4%, n = 20), biopsy with referral to another institution (7.4%, n = 9), photo/video recording followed by removal during a separate colonoscopy (4.1%, n = 5), and photo/video recording with referral to another institution (3.3%, n = 4). Multivariate logistic regression analysis showed that adherence to each additional quality PM increased the odds of optimal polyp management by 32% (OR, 1.32 [95% CI, 1.03 to 1.70]; $P = .03$), after adjusting for other relevant factors such as hospital type and annual number of colonoscopies performed

TABLE 1. Respondent Characteristics

Variable	No. (%)
Total No. of surveys analyzed	122 (100.0)
Age, years	
<30	25 (20.5)
31-40	41 (33.6)
41-50	39 (32.0)
51-60	12 (9.8)
>60	5 (4.1)
Sex	
Male	89 (73.0)
Female	33 (27.0)
Geography	
North (Zhytomyr, Chernihiv, Kyiv, Sumy regions)	54 (44.3)
South (Odesa, Mykolaiv, Kherson regions, AR Crimea)	7 (5.7)
West (Chernivtsi, Ivano-Frankivsk, Khmelnytskyi, Lviv, Rivne, Volyn, Zakarpattia, Vinnytsia, Ternopil regions)	25 (20.5)
East (Kharkiv, Luhansk, Donetsk, Dnipro, Zaporizhzhia regions)	20 (16.4)
Central (Cherkasy, Kropyvnytskyi, Poltava regions)	16 (13.1)
Hospital type	
Public	73 (59.8)
Private	31 (25.4)
Both	18 (14.8)
Years of practice	
<3	32 (26.2)
4-10	41 (33.6)
11-15	19 (15.6)
>15	30 (24.6)
Annual No. of colonoscopies	
<100	28 (23.0)
100-300	43 (35.2)
>300	51 (41.8)

Abbreviation: AR, Autonomous Republic.

(Table 2). When PMs were examined individually, photo/video recording (OR, 7.57 [95% CI, 1.66 to 34.49]; $P < .01$) and allocation of an adequate time slot for the procedure (OR, 3.86 [95% CI, 1.18 to 12.61]; $P = .03$) were significantly associated with higher odds of optimal polyp management in the adjusted model (Table 3). Nonadherence to any of the six calculated PMs (20.5%, n = 25) significantly decreased the odds of the optimal strategy in univariable analysis (OR, 0.32 [95% CI, 0.13 to 0.79]; $P = .01$), but this effect was not observed in the multivariable model. Figure 2 illustrates the distribution of polypectomy techniques used by respondents, with cold snare polypectomy (86.9%, n = 106) being the most frequently reported method.

Figure 3 outlines the perceived barriers to implementing screening colonoscopy in Ukraine among respondents. The most commonly reported barriers included insufficient provision of equipment (67.2%, n = 82), inadequate supply of consumables (60.7%, n = 74), and insufficient reimbursement by the National Health Services of Ukraine (59.8%, n = 73). Insufficient compensation for endoscopists (57.4%, n = 70) and inadequate training of specialists (41.0%, n = 50) were also frequently cited. Less commonly identified barriers included excessive workload on specialists (28.7%, n = 35) and insufficient access to international recommendations (8.2%, n = 10).

The analysis of educational resources used by respondents shows a strong reliance on various forms of supplementary training and guidance. Notably, all respondents reported using additional educational resources, with medical expert training on screening colonoscopy (82.0%, n = 100), ESGE guidelines (77.0%, n = 94), and national scientific conferences (74.6%, n = 91) being mentioned most commonly (Fig 4). Educational seminars on screening colonoscopy (70.5%, n = 86) and recommendations from the Ukrainian Association of Endoscopists (68.0%, n = 83) were also widely used. Internship training (66.4%, n = 81) and mentorship or advice from colleagues (62.3%, n = 76) were additionally reported as valuable resources.

DISCUSSION

This study provides the first nationwide assessment of adherence to colonoscopy quality PMs among endoscopists in Ukraine—a LMIC currently implementing a population-based CRC screening program. We found that adherence to noncalculated PMs was generally high, whereas calculated PMs such as ADR and bowel preparation quality were reported less frequently. Although most respondents reported performing endoscopic polypectomy during the same procedure, notable variation in management approaches and reported barriers highlights systemic challenges to delivering high-quality screening colonoscopy. Importantly, our analysis showed that adherence to each additional PM, as well as to specific measures such as photo/video recording and adequate procedure time allocation, can significantly increase the odds of optimal polyp management, reinforcing the clinical significance of comprehensive quality monitoring. These findings underscore the need for structured quality assurance initiatives as Ukraine advances its national CRC screening rollout.

ADR is widely regarded as the most critical quality indicator in colonoscopy and was reported by 59.8% of respondents in this study (Fig 1B)—a rate consistent with data from Italy.[22] ADR is inversely associated with the risk of interval cancers, with higher ADRs (>25%) linked to reductions in both CRC incidence and mortality.[7,8] Given this association, ADR represents a strategic focal point for colonoscopy quality improvement (QI) efforts. In the United Kingdom, nationwide audits have successfully enhanced ADR through targeted QI initiatives such as measuring and extending colonoscope withdrawal time, optimizing bowel preparation (particularly in frail patients), lengthening procedure slots, and concentrating procedures among more experienced

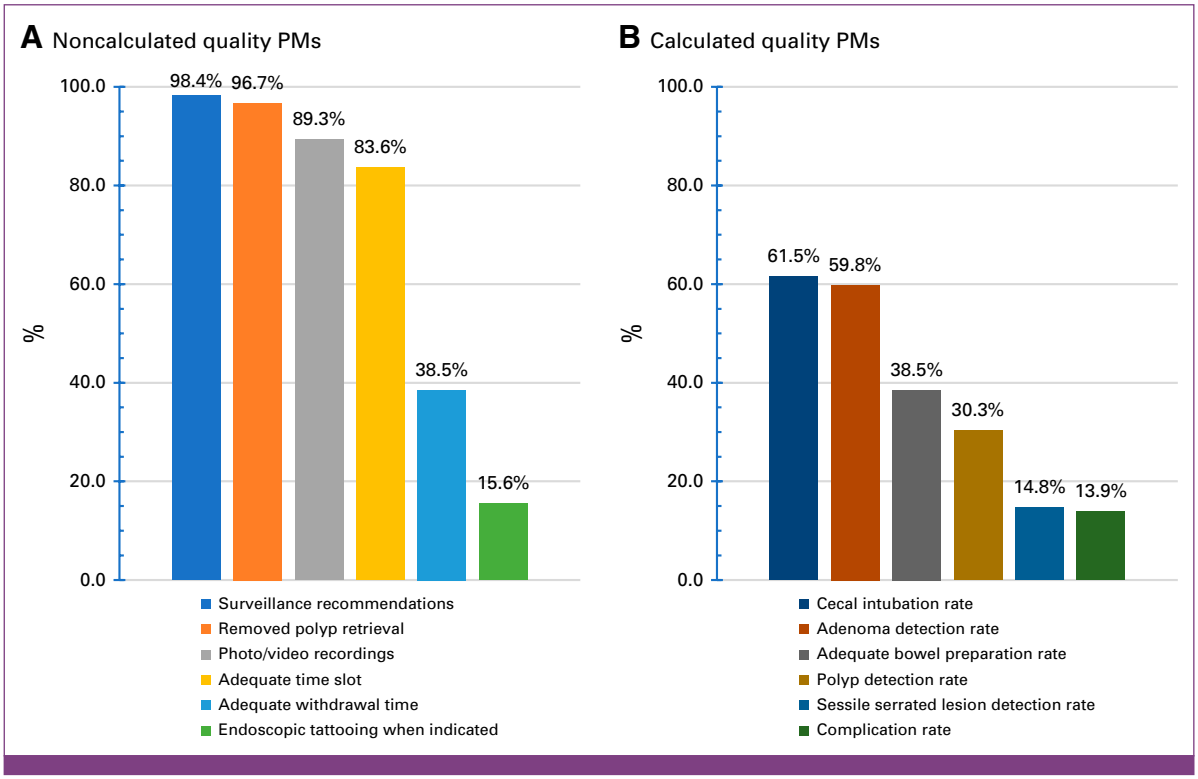

FIG 1. Adherence to the quality PMs for screening colonoscopy. (A) Noncalculated quality PMs. (B) Calculated quality PMs. PMs, performance measures.

operators.[23] Educational interventions have also proven effective in improving ADR, especially for proximal lesions. Additionally, the implementation of electronic reporting systems that automatically display and document procedure duration may help improve adherence to withdrawal time recommendations. Despite being a significant quality indicator strongly correlated with ADR,[24] adequate withdrawal time was reported by only 38.5% of our respondents. Regression analysis also showed that allocation of adequate time slots was positively associated with optimal polyp management, emphasizing that system-level adjustments such as ensuring sufficient colonoscopy time allowing for both detection and removal of polyps during the same procedure can translate into better patient outcomes. These examples highlight the importance of audit-based feedback,

TABLE 2. Multivariable Logistic Regression Analysis of Number of Quality PMs Associated With Optimal Detected Polyp Management

Factor	OR	95% CI	*P*
No. of quality PMs	1.32	1.03 to 1.70	**.03**
Hospital type			
Public	1.00	—	—
Private	2.48	0.72 to 8.54	.15
Both	0.53	0.17 to 1.63	.27
Annual No. of colonoscopies			
<100	1.00	—	—
100-300	2.86	0.98 to 8.37	.06
>300	2.00	0.66 to 6.03	.22

NOTE. Bold *P* denotes statistical significance.
Abbreviations: OR, odds ratio; PMs, performance measures.

TABLE 3. Multivariable Logistic Regression Analysis of Individual Quality PMs Associated With Optimal Detected Polyp Management

Factor	OR	95% CI	*P*
Photo/video recordings	7.57	1.66 to 34.49	**<.01**
Adequate time slot	3.86	1.18 to 12.61	**.03**
Cecum intubation rate	1.83	0.72 to 4.64	.21
ADR	1.39	0.52 to 3.72	.51
Hospital type			
Public	1.00	—	—
Private	2.23	0.61 to 8.15	.23
Both	0.37	0.11 to 1.24	.11
Annual number of colonoscopies			
<100	1.00	—	—
100-300	3.66	1.07 to 12.55	**.04**
>300	2.47	0.73 to 8.38	.15

NOTE. Bold *P* denotes statistical significance.
Abbreviations: ADR, adenoma detection rate; OR, odds ratio; PMs, performance measures.

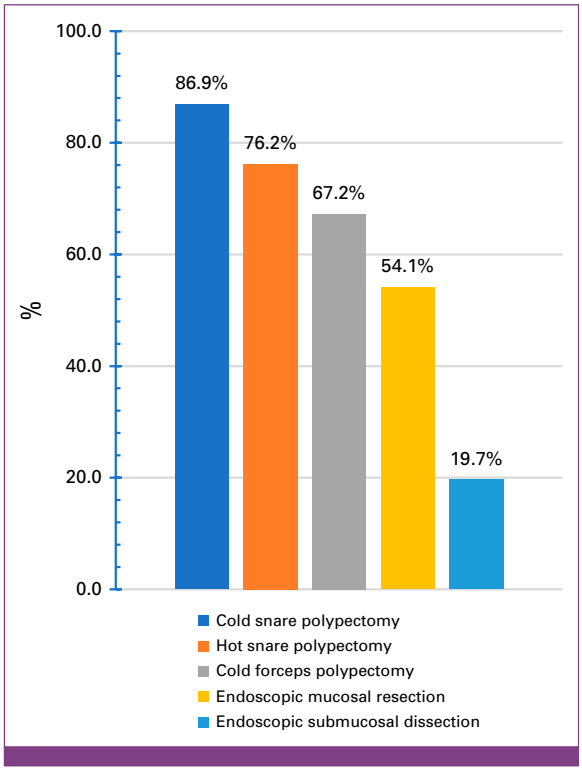

FIG 2. Used polypectomy techniques.

structured training, and modern equipment in driving tangible improvements in colonoscopy quality.[25]

Our findings highlighted gaps in the visual documentation of colonoscopy procedures. Although the majority of respondents reported capturing photo or video recordings during examinations, only 63.1% (n = 77) of respondents included photographs of anatomic landmarks and lesions in their reports. Similar trends have been observed in European studies on upper GI endoscopy, where only 35%-70% of reports contained adequate visual documentation.[25] The omission of key images from procedure reports may hinder communication between health care providers and impede appropriate patient care and follow-up.[26] Standardized reporting protocols that incorporate mandatory image capture, particularly of critical landmarks such as the cecum, can help ensure consistency and support quality assurance. Beyond documentation, our findings demonstrated that photo/video recording itself was strongly associated with optimal polyp management, suggesting that this practice may promote accountability, support real-time decision making, and encourage adherence to best colonoscopy practices. Thus, integrating software that allows automatic attachment of recorded images or videos into endoscopy reports could significantly reduce documentation burden and promote routine PM adoption.

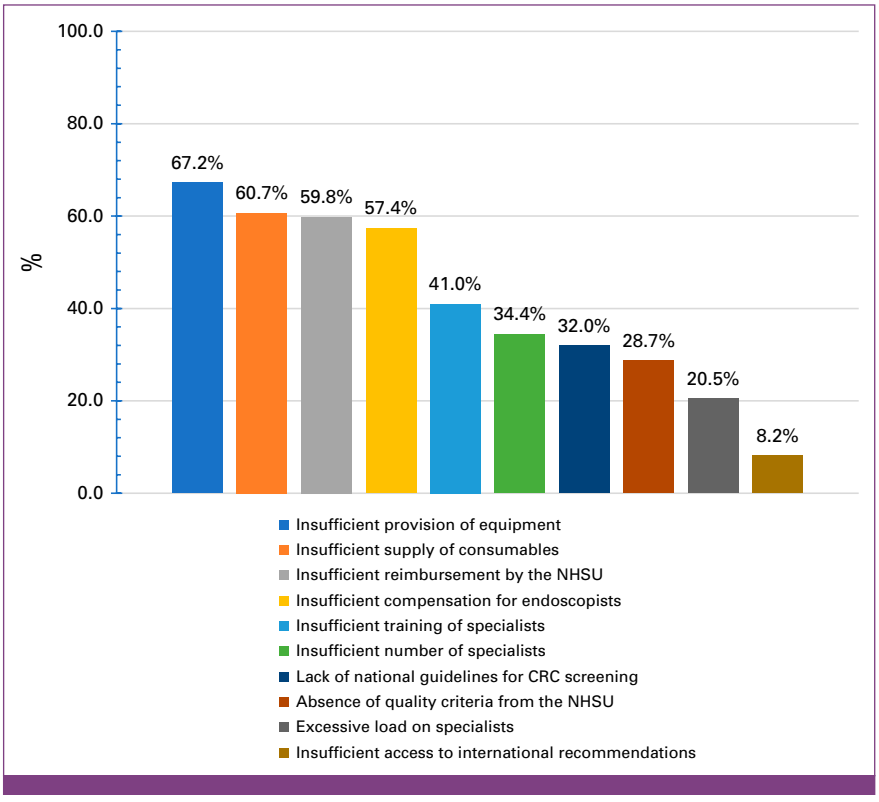

FIG 3. Perceived barriers to screening colonoscopy implementation. CRC, colorectal cancer; NHSU, National Health Service of Ukraine.

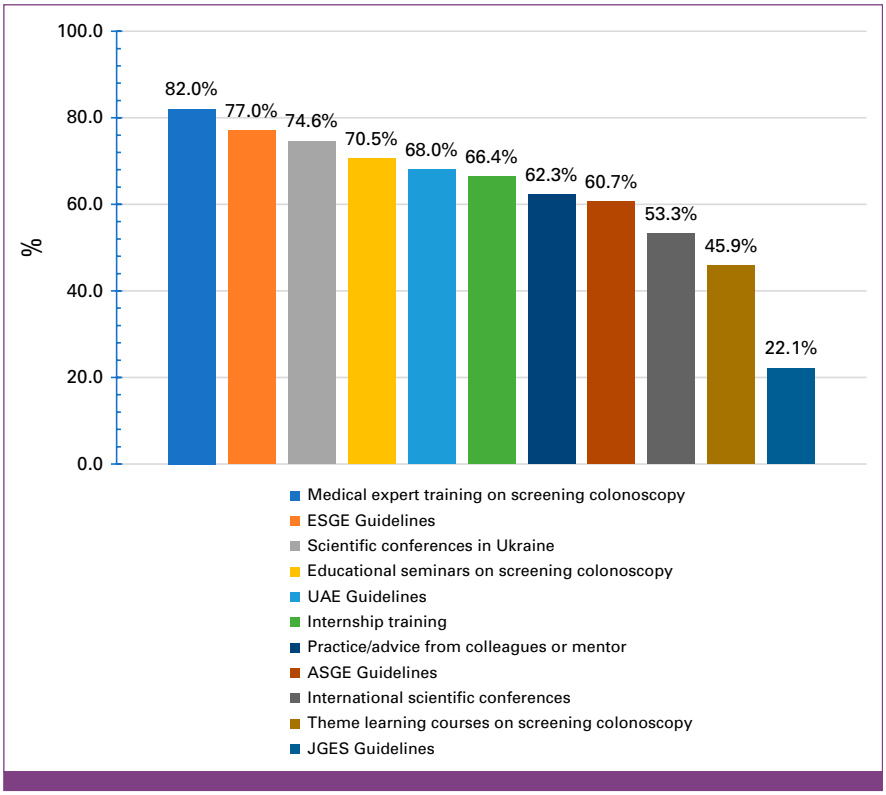

FIG 4. Additional educational resources. ASGE, American Society Gastrointestinal Endoscopy; ESGE, European Society Gastrointestinal Endoscopy; JGES, Japan Gastroenterological Endoscopy Society; UAE, Ukrainian Association of Endoscopists.

We also identified notable variation in polyp treatment practices. Suboptimal management was reported by 31.1% of endoscopists and included approaches such as biopsy of a precancerous lesion followed by delayed removal during a separate colonoscopy or referral to another institution (Fig 2). Regrettably, these practices increase the risk of incomplete resection and may contribute to the development of interval CRC.[27] Furthermore, biopsy of a precancerous polyp can induce submucosal fibrosis, complicating or even precluding future polypectomy.[28] In addition to their clinical implications, these approaches can result in unnecessary repeat procedures and increased health care costs. Our logistic regression analysis demonstrated that adherence to each additional quality PM was associated with optimal polyp management, underscoring the clinical relevance of consistent quality reporting. This association highlights the need to integrate PMs into routine endoscopic practice, not merely as a compliance metric, but as a driver of improved patient outcomes. While all PMs are important, interventions should particularly target calculated PMs, which were less frequently reported by respondents and, according to our univariable analysis, nonadherence to them may contribute to suboptimal treatment strategies for detected polyps. To reduce variation in lesion management, QI efforts should prioritize real-time polyp removal, standardized documentation protocols, software-supported automatic PMs calculation, and regular audit-and-feedback mechanisms. Educational interventions, case-based learning, and hands-on training—also through international collaboration and mentorship—can further support consistent, evidence-based practices.[29]

Screening colonoscopy faces multiple barriers in low-income countries and underserved populations. System-level obstacles include limited endoscopic capacity, inadequate infrastructure, supply shortages, and a lack of trained personnel.[18,30,31] Organizational factors, such as poor coordination between primary and specialty care and widespread staffing deficits, often further compound the problem.[17,18,31] Patient-level barriers include fear of pain, complications, or a cancer diagnosis; challenges with bowel preparation; and limited awareness or motivation to undergo CRC screening.[17] In our study, Ukrainian endoscopists also identified a few barriers, specific to high-quality screening colonoscopy in their daily practice—most notably, lack of equipment and unreliable access to essential consumables—which may partly explain the low rate of endoscopic tattooing (15.6%) and the variation in detected polyps management approaches. These systemic health care challenges call for comprehensive interventions focused on equipment procurement, reliable supply chains, structured training, and patient navigation infrastructure.[30] In Ukraine and other LMICs, addressing these gaps will require coordinated investment in endoscopy services,

the integration of PMs into national screening policies, and sustained international partnerships to support workforce development and resource stability.

This study used a survey-based design, which carries both strengths and limitations. Its primary advantage is the ability to distribute surveys online, facilitating broad outreach and a relatively high number of completed responses. Although online survey response rates vary with the number and complexity of questions, a rate of 20%-30% is generally acceptable; our response rate of 22.6% supports the validity of the findings. Regarding limitations, the use of a sampling method through an email survey of EndoAcademy members may introduce selection bias by excluding endoscopists who are not members of this professional network. Additionally, war-related factors, including direct Russian occupation, infrastructure damage, and power outages, may also have limited participation from certain regions, potentially affecting the generalizability of the findings. Finally, as with all self-reported data, responses are subject to recall and social desirability biases, which may lead to overestimation of adherence to guideline-based practices. Nonetheless, this study provides essential baseline data on endoscopic practices in Ukraine and offers actionable insights to inform future QI and policy development efforts.

In conclusion, this study offers the first national assessment of colonoscopy quality performance in Ukraine, identifying high adherence to noncalculated PMs alongside key gaps in calculated indicators, documentation, and polyp management. Adherence to quality PMs was strongly associated with optimal detected polyp treatment, with practices such as photo/video recording and adequate procedure time allocation emerging as particularly important factors. As Ukraine launches its population-based CRC screening program, these findings highlight the need for structured quality assurance, modern equipment, audit-and-feedback mechanisms, and targeted educational initiatives. Integrating internationally recognized PMs into endoscopy training and leveraging international mentorship will be critical for improving performance and patient outcomes. Continued leadership from national scientific societies will be key to ensuring consistent, high-quality colonoscopy practice across the country.

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PRIOR PRESENTATION

Presented in part at the 2024 Annual Scientific Meeting of the American Society of Colon and Rectal Surgeons, Baltimore, MD, June 1-4, 2024; and the 2024 European Society of Gastrointestinal Endoscopy Days, Berlin, Germany, April 25-27, 2024.

DATA SHARING STATEMENT

A data sharing statement provided by the authors is available with this article at DOI https://doi.org/10.1200/GO-25-00390.
Upon request and subject to review, Pfizer will provide the data that support the findings of this study. Subject to certain criteria, conditions, and exceptions, Pfizer may also provide access to the related individual deidentified participant data. See https://www.pfizer.com/science/clinical-trials/trial-data and results for more information. The data set created and analyzed during the current study is available from the corresponding author upon reasonable request.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians (Open Payments).

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No other potential conflicts of interest were reported.

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