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From Guidelines to Real-World Practice: Adherence to Prophylactic Measures for Post-ERCP Pancreatitis and ERCP Quality Monitoring in Slovakia and Czechia

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ABSTRACT

Background & Aims: Endoscopic retrograde cholangiopancreatography (ERCP) is an established procedure for treatment of biliopancreatic disorders. However, it is associated with a risk of complications, most notably post-ERCP pancreatitis (PEP). Several evidence-based strategies have been shown to reduce this risk. These preventive measures, together with key ERCP quality indicators, are incorporated into international guidelines to enhance procedural safety and facilitate inter-center comparisons. This study aimed to evaluate the adherence of Slovak and Czech endoscopists to these recommendations.
Methods: A voluntary, 20-item cross-sectional survey was conducted among selected ERCP centers in Slovakia and Czechia using a cloud-based platform between January and June 2024.
Results: Twenty-six of 37 ERCP centers (70.3%, 14 from Slovakia and 12 from Czechia) responded to the survey. Post-ERCP pancreatitis and cannulation rates were systematically tracked by 53.8% and 38.5% of centers, respectively, and 42.4% applied objective measures when assessing difficult cannulation. Rectal nonsteroidal anti-inflammatory drugs (NSAIDs) were routinely administered to unselected ERCP patients in 53.9% of centers, while 75% of the remaining centers withheld them from patients with a history of ERCP and prior papillotomy. Indomethacin was the only NSAID used. Only 26.9% of centers employed aggressive hydration according to the recommended protocol. Twelve centers (46.2%) placed prophylactic pancreatic stents during difficult cannulation when the pancreatic duct was accessible, whereas six centers (23.1%) reported using pancreatic stents only rarely. No significant differences were observed between Slovak and Czech centers.
Conclusions: Current monitoring practices of key ERCP quality indicators in Slovakia and Czechia, such as PEP incidence and cannulation outcomes, fall short of recommended standards. Although most centers apply prophylactic measures, these are not used universally. This underscores the importance of implementing mandatory quality monitoring and promoting further standardization and improvement in preventive practice.

Key words: endoscopic retrograde cholangiography – ERCP – pancreatitis – prophylaxis – indomethacin – pancreatic stent – guideline adherence – quality indicators.

Abbreviations: ASGE: American Society for Gastrointestinal Endoscopy; ERCP: Endoscopic retrograde cholangiopancreatography; ESGE: European Society of Gastrointestinal Endoscopy; NSAID: nonsteroidal anti-inflammatory drug; PEP: post-ERCP pancreatitis.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a widely used procedure for treatment of pancreaticobiliary disorders. Despite its clinical utility, ERCP carries a risk of complications, the most frequent being post-ERCP pancreatitis (PEP). The incidence of PEP has remained relatively stable over recent decades, occurring in approximately 4,6% of procedures [1]. Although most cases are mild, about 0.5% of patients develop severe pancreatitis, which is associated with significant morbidity and mortality [2].

Evidence-based strategies that combine safe ductal cannulation with pharmacologic prophylaxis, most notably rectal nonsteroidal anti-inflammatory drugs (NSAIDs), have been shown to reduce the risk of PEP and are strongly endorsed by major gastrointestinal societies, including the European Society of Gastrointestinal Endoscopy (ESGE) and

the American Society for Gastrointestinal Endoscopy (ASGE), in their guidelines for PEP prevention [3–5]. In parallel, ERCP-related quality performance measures reflecting adherence to PEP prevention strategies have also been defined [6].

Real-world implementation of these guidelines has not been well documented, and structured data on ERCP quality indicators are often missing, limiting opportunities for benchmarking and improvement. A voluntary cross-sectional survey was conducted among ERCP centers in Slovakia and Czechia to evaluate the reporting of quality indicators and adherence to guideline-recommended PEP prevention practices.

METHODS

Between January and June 2024, a 20-item online questionnaire was emailed to the heads of 37 endoscopy centers in Slovakia and Czechia using Google Forms. Participation was voluntary and anonymous. To optimize the response rate, non-respondents received up to two email reminders, with a maximum of three contact attempts overall. In some cases, centers were contacted by telephone.

The survey included four questions addressing key institutional characteristics: country (Slovakia or Czechia), annual ERCP volume, number of endoscopists performing ERCP, distinguishing between senior and junior practitioners, and trainee involvement in ERCP procedures. The definitions of ERCP volume categories and expertise levels are provided in the Supplementary file.

The remaining 16 questions addressed ERCP quality indicators, including the monitoring of PEP and cannulation rates; assessment of difficult cannulation in routine practice—covering both adherence to guideline definitions and real-world evaluation methods; preferred cannulation techniques; and the use of prophylactic measures for PEP prevention (see Supplementary file, Table S1). The questionnaire was piloted among a small group of endoscopists, and minor revisions were made based on their feedback to improve clarity and consistency.

Ethical Considerations

According to Slovak and Czech legislation and EU Regulation 2016/679 (GDPR), this anonymous, voluntary survey of healthcare professionals did not involve patient data or personal identifiers and therefore did not require formal ethics committee approval.

Statistical Analysis

Descriptive statistics are reported as counts with percentages or medians with ranges. Differences in ordered categorical variables were tested using the Wilcoxon rank-sum test, and differences in non-ordered categorical variables using the Fisher's test. The alpha level of 0.05 was considered to indicate statistically significant differences. In this exploratory analysis, no correction for multiple testing was applied. Analyses were performed using R, version 4.5.0 (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

A total of 26 out of 37 ERCP centers (70.3%) responded to the survey, including 14 from Slovakia and 12 from Czechia. Among the respondents, 13 centers (50%) were classified as high-volume, 12 (46.2%) as medium-volume, and 1 (3.9%) as low-volume. Czech centers were generally larger, with a higher proportion of high-volume units than Slovak centers (p=0.02). The number of ERCP-performing endoscopists per center differed between Slovakia (median of 2.5; range 1–5) and Czechia (median 4.5; range 1–12), (p=0.026). Regular involvement of trainees in ERCP procedures was reported by 19 centers (73.1%). Further details on center volume, number of endoscopists, and trainee involvement are provided in the Supplementary File.

Monitoring of ERCP Quality Indicators

More than half of the surveyed centers (14/26, 53.8%) reported monitoring PEP rates, although most of these (12/14, 85.7%) restricted data collection exclusively to inpatients, without including referred cases (Table I). Monitoring practices did not differ significantly between Slovakia and Czechia (p=0.865). Only 10 centers (38.5%) reported systematic tracking of cannulation rates, again with no inter-country difference (p=0.566; Table I). The main barriers to quality indicator monitoring were lack of time, limited staff resources, and the absence of a standardized methodology (reported by 83.3% of centers that did not collect these data). Additional information on attitudes and barriers toward systematic monitoring is provided in the Supplementary File.

Table I. PEP and cannulation rate monitoring practices and scope of data collection

	Centers, n (%)
PEP rate monitoring method (n = 26)	
Dedicated internal registry	3 (11.5)
Periodic audits	11 (42.3)
No monitoring or data collection	12 (46.2)
Scope of monitoring of PEP (n=14)	
• Inpatients only	12 (85.7)
• Inpatients and a subset of referred or outpatient cases	2 (14.3)
• All patient categories, including complete referrals	0
Cannulation rate monitoring method (n=26)	
Dedicated internal registry	1 (3.9)
Periodic audits or selective monitoring (e.g., trainees)	9 (34.6)
No monitoring or data collection	16 (61.5)

PEP: post-ERCP pancreatitis.

Eleven centers (42.4%) used at least one objective measure to assess difficult cannulation, whereas the remaining centers relied on subjective judgment or clinical experience (Table II). There were no significant differences between Slovak and Czech centers (p=0.290). All surveyed centers reported initiating cannulation with a sphincterotome, and nearly all (96.1%) predominantly used the guidewire-assisted technique.

Prevention of PEP

Fourteen centers (53.9%) routinely administered rectal NSAIDs to all patients immediately before or after ERCP.

Table II. Objective measures recorded for difficult cannulation assessment among surveyed centers

	Centers, n (%)
Measure	
Both papilla contacts and cannulation time	1 (3.9)
Papilla contacts only	2 (7.7)
Cannulation time only	2 (7.7)
Papilla contacts recorded; cannulation time only estimated	6 (23.1)
No objective measures recorded	15 (57.7)

The remaining centers administered NSAIDs only to selected patients or applied them inconsistently with respect to timing (Table III). There were no significant differences between Slovak and Czech centers (p=0.379). Among the 12 centers providing additional comments, most (75%) reported withholding NSAIDs in patients with a history of ERCP and prior sphincterotomy (Table III). Indomethacin was the only NSAID used across all centers.

Table III. Rectal NSAID administration practices, reasons for non-routine use, and use of aggressive hydration for PEP prophylaxis among surveyed centers

	Centers, n (%)
Rectal NSAID administration practices and reasons for non-routine use among surveyed centers (n=26)	
NSAIDs administered to all patients immediately before or after ERCP	14 (53.9)
NSAIDs administered to selected patients immediately before or after ERCP	11 (42.3)
NSAIDs administered to selected patients, not always immediately before or after ERCP	1 (3.9)
Reasons for non-routine use of NSAIDs (n=12)	
No NSAIDs for patients with prior ERCP and sphincterotomy	9 (75)
NSAIDs used selectively for high risk procedures only	2 (16.67)
Insufficient personnel to administer NSAIDs	1 (8.33)
Aggressive hydration practice	
Used in patients with contraindication to NSAIDs	3 (11.5)
Used in patients with contraindications to NSAIDs, combined with other prophylactic measures (e.g., pancreatic stenting)	4 (15.4)
Used in patients with contraindications to NSAIDs; modified protocol applied (regarding fluid type and/or dosage)	2 (7.7)
No use of aggressive hydration	17 (65.4)

NSAID: nonsteroidal anti-inflammatory drugs.

Seven centers (26.9%) applied aggressive hydration according to the ESGE-recommended standard protocol [4]. The remaining centers either did not use aggressive hydration for PEP prophylaxis or applied it in a non-standard manner (Table III). No significant differences were found between Slovak and Czech centers (p=0.412).

Nearly half of the centers (12/26, 46.2%) reported placing prophylactic pancreatic stents during difficult biliary cannulation in cases meeting ESGE 2020 criteria for easy pancreatic stenting [4]. However, a considerable proportion of centers indicated that pancreatic stents were placed only rarely, with no difference between Slovak and Czech centers (Fig. 1). Time constraints, skepticism among endoscopists regarding the efficacy of pancreatic stents placement, concerns about papillary injury or pancreatic juice obstruction following failed placement, and established practice patterns were the most frequently cited reasons for its infrequent use. The interval for evaluating pancreatic stents passage ranged from 24 hours to 4 weeks, most commonly within the first 7 days following placement (Supplementary File).

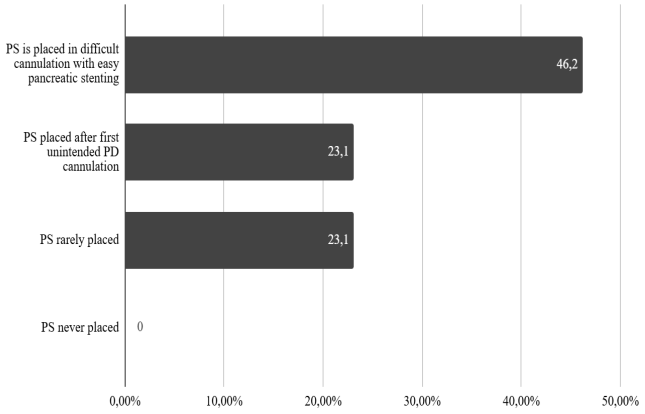

Fig. 1. Prophylactic pancreatic stent placement practices during biliary cannulation (p-values for differences between Slovak and Czech respondents for questions corresponding to rows 1–4 are 0.713, 0.652, 0.365, and 1, respectively).

DISCUSSION

To the best of our knowledge, this is the first study from Slovakia and Czechia to evaluate adherence to ERCP quality indicators and PEP prophylaxis measures as recommended in the latest ESGE guidelines [3, 4, 6]. Unlike pan-European surveys that primarily focused on training conditions [7], our analysis offers a regional perspective on the real-world implementation of these practices. Almost all Slovak centers performing ERCP participated (14/17; 82.4%), whereas the lower response rate among Czech centers limits generalizability and likely reflects voluntary participation bias. Despite explicit ESGE recommendations identifying PEP incidence tracking as a core quality indicator [6], systematic monitoring remains inconsistent in both Slovakia and Czechia. Nearly half of the centers (46.2%) did not collect data on PEP. Similar results were reported in a 2021 Belgian survey [8], where only 30% of centers tracked key ERCP indicators, and in a 2023 pan-European survey [7], where PEP rates were monitored in 50.2% of high-volume and 36.0% of low-volume centers. In Slovakia and Czechia, a substantial proportion of ERCP procedures are performed in patients referred from other institutions who are discharged shortly after the intervention. This organizational structure poses a challenge to the systematic identification and follow-up of PEP cases. Consequently, it is

not surprising that 85.7% of centers in our survey reported monitoring only inpatients, thereby excluding referred cases. Such selective surveillance likely results in underestimation of the true incidence of PEP and limits the ability to perform meaningful inter-center comparisons. Improved coordination and data sharing between institutions could facilitate more comprehensive reporting of procedure-related complications, which should be achievable, at least through audits of 100 consecutive cases, as recommended by the ESGE [6]. Notably, 42.3% of centers reported performing such audits, indicating a willingness to engage in quality monitoring despite logistical challenges. None of the respondents expressed negative views toward tracking key performance indicators such as PEP and cannulation rates, suggesting broad support for these measures. Although 73.1% of centers reported regular trainee participation, 61.5% did not monitor biliary cannulation rates, a more reliable indicator of trainee competency than the total number of ERCPs performed [7], highlighting a gap between training involvement and objective performance assessment.

In our survey, over half of respondents relied on subjective judgment to assess biliary cannulation difficulty, deviating from guideline recommendations that call for objective criteria such as procedure time or number of attempts. Similar variability was reported in an international survey by Kouanda et al. [9], in which most endoscopists continued beyond recommended limits before changing strategy. Future research should explore how practice variability resulting from imprecise measurement of cannulation time influences PEP risk, particularly in the context of training and quality assurance.

Although all centers reported routine availability of rectal NSAIDs for PEP prevention, only half administered them to all patients, as recommended by both the ESGE and ASGE [4, 5]. The selective use observed, most frequently the omission of NSAIDs in post-sphincterotomy cases, illustrates incomplete implementation of evidence-based prophylaxis despite their low cost and broad availability. This practice may reflect the perception of a lower PEP risk in these patient groups, supported by some observational data [10]. Our findings are consistent with a survey from the United States by Ashat et al. [11], which reported NSAIDs use in 38.4% of high-risk and 53.9% of average-risk procedures. In contrast, a Dutch survey demonstrated an increase and near-universal adoption of NSAIDs use for PEP prophylaxis, from 98% of endoscopists using NSAIDs in 2013 (of whom 62% used them in >80% of procedures) to 100% in 2020 (with 92.7% using them in >80% of procedures) [12]. Overall, the routine use of rectal NSAIDs in unselected patients remains inconsistent worldwide. Potential barriers include skepticism regarding efficacy, safety concerns, cost considerations, and lack of awareness of guideline recommendations. In our survey, however, none of the respondents expressed concerns about efficacy or cost; the latter is likely attributable to the low price of rectal indomethacin in Slovakia and Czechia (less than €1 per 100 mg dose).

About half of respondents reported placing a pancreatic stent during difficult cannulation with easy pancreatic stenting. Nearly one-quarter used stents infrequently, citing doubts about their efficacy or concerns about papillary trauma. This variation mirrors broader differences in clinical practice. U.S. data from 26,820 high-risk ERCPs (2009–2018) showed a decline in prophylactic pancreatic stent use from 40.7% to 3.0%, which may relate to the increasing use of NSAIDs, although other factors such as reimbursement policies or training patterns may also contribute [13]. In contrast, a Dutch survey reported the opposite trend, with prophylactic PS used by 14% of endoscopists in 20–40% of ERCPs in 2013, rising to 20% in 2020 [12]. The limited use of pancreatic stents in some surveyed centers may reflect insufficient technical confidence or experience with pancreatic stent placement. This interpretation is consistent with a 2011 survey by Coté et al. [14], which found that low-volume endoscopists were less comfortable with pancreatic duct stenting than high-volume practitioners (57% vs. 92%). In our survey, however, infrequent stent use was reported only by medium- and high-volume centers, suggesting that factors other than procedural volume, such as institutional culture, individual risk–benefit assessment, or operator preference, may contribute to this variation, even when good pancreatic duct access is achieved.

Establishing a structured national registry of ERCP, modelled on systems such as the Swedish *GallRiks* or the Dutch ERCP quality registry, would provide the most effective framework for systematic monitoring of outcomes and adherence to quality indicators [15, 16].

The main strength of this study lies in its focus on real-world practice and the near-complete national participation achieved in Slovakia. However, several limitations should be acknowledged: (1) the self-reported design may have led to overestimation of adherence; (2) responses were limited to unit heads, excluding perspectives from other practitioners; (3) participation bias among Czech centers likely skewed the sample toward high-volume institutions; and (4) the survey did not distinguish between prophylaxis for average- and high-risk cases, thereby limiting the possibility of risk-adjusted analysis.

CONCLUSIONS

Current monitoring practices of key ERCP quality indicators in Slovakia and Czechia, such as PEP incidence and cannulation outcomes, fall short of recommended standards, highlighting the need for standardized and mandatory quality monitoring. Most centers reported using prophylactic measures, primarily rectal NSAIDs, although these were not always applied universally, contrary to current guideline recommendations. Additional strategies, such as aggressive hydration and pancreatic stenting, were used less frequently, highlighting opportunities for further improvement in PEP prevention.

Conflicts of interest: None to declare.

Authors' contributions: B.K. and J. Martínek conceived and designed the study. B.K and R.H. analyzed the data and drafted the manuscript. J. Mareš performed the statistical analysis. J. Martínek revised the manuscript for important intellectual content and supervised the study. All the authors read and approved the final version of the manuscript.

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Supplementary material: To access the supplementary material visit the online version of the *J Gastrointestin Liver Dis* at http://dx.doi.org/10.15403/jgld-6680

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