

# Vade Mecum in ERCP: a roadmap to success: Tips from experts for excelling in ERCP



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## ABSTRACT

**Background and study aims** Training in endoscopic retrograde cholangiopancreatography (ERCP) is operator-dependent and traditionally, the apprenticeship model, in which experts are considered to be role models, has been adopted for it. The aim of this study was to develop a practical guide compiling tips from experts to help guide trainees to succeed in ERCP.

**Methods** A web-based survey was created to understand the professional development of ERCP experts, the investments they made, the obstacles they overcame, and the quotes that guided their professional life. ERCP experts worldwide were invited to participate.

**Results** Fifty-three experts (of 71; 74.6%) from 24 countries answered the survey. Experts started ERCP training early (average age 31 years; range, 24–52 years) and it often was combined with training for endoscopic ultrasound. A long training period (average 21 months; range, 3–120 months) was needed to achieve competence, frequently in another department, and it was commonly complemented with research in the field (76.5%). “Time and practice” were the most worthwhile investments they made to achieve success. “Sports” were an area outside endoscopy frequently considered to be important to acquire the skills necessary to excel in ERCP. “Lack of dedicated time for training” and “peer competition” were the biggest obstacles the experts faced. Several pieces of advice were given to the experts, such as to be resilient, careful, patient, responsible, and hard-working. “Personal life” was mentioned as an undeniably crucial factor for achieving long-term success that should not be forgotten.

**Conclusions** This survey is the first to provide insight regarding the professional trajectory of renowned ERCP experts worldwide, providing valuable recommendations to help trainees excel in ERCP.

## Introduction

In the specialized domain of endoscopic retrograde cholangiopancreatography (ERCP), proficiency demands a skill set that is intricately tied to operator technical, cognitive, and integrative abilities [1]. The demanding nature of ERCP arises from the protracted learning curve essential to achieve competence [2, 3] and the heightened occurrence of associated adverse events (AEs) [4].

An expert is defined as an individual who has achieved mastery in a particular area of knowledge or skill, consistently demonstrating a performance level surpassing the average. Given the traditional adherence of ERCP to the apprenticeship model, it is rational to seek guidance from these experts and consider them as role models. The comprehension of ERCP experts' professional trajectory, their strategic investments, and their success in overcoming professional challenges serve as a substantive example for trainees aspiring to follow a similar path toward success in this area.

The Latin term "*Vade Mecum*," which literally translated to "go with me," historically refers to a guide carried for immediate reference. In this context, our *vade mecum* aimed to compile practical insights from ERCP experts, providing trainees with a valuable compendium of knowledge to facilitate their journeys toward proficiency in this field.

## Methods

### Study design and participants

A web-based survey was developed to gather insights into the professional development and experience of ERCP experts, by identifying key milestones in their career advancement and assembling recommendations for trainees striving for excellence in this field (supplementary material).

The questionnaire was then distributed to 71 ERCP experts from high-volume training centers worldwide. These experts were identified based on their recognized expertise and peer acknowledgment. Selection criteria included reputation and contributions to the field, to ensure a diverse and knowledgeable sample.

### Development and content of survey instrument

An online Google form survey instrument was created, consisting of 24 open-ended questions covering various aspects of training, career progression and personal reflections. It was organized into the following five domains: specifics in ERCP/EUS training, investments, advice to be (or not to be) followed, obstacles, and quotes to guide professional life. The final survey version was distributed after pilot testing among the authors.

### Survey distribution and collection of data

The survey was distributed to experts via email. A brief statement describing the goal of the study and informing respondents that their participation constituted their voluntary consent to the study were included in the invitation, as well as a link to the survey. Two mailing reminders were sent to non-respondents to maximize participation.

Because this study did not involve sharing of patient data, Ethics Committee approval was not attained.

Questionnaire answers were voluntary and individual responses stayed confidential and were only assessed by the researchers. Published data are reported as average or as totals from the group, no individual responses were reported, and data are not directly traceable to participants.

### Study endpoints

The primary endpoint was to determine important points in experts' professional development. Secondary endpoints included capturing experts' recommendations to excel in ERCP.

### Data analysis

All data provided per user was automatically documented in a software database (Microsoft Excel). Questions 2,3,5–7,10,12, and 13 were then structured as binary (yes/no) responses for ease of quantitative analysis. Questions 4,8, and 9, which sought information on timings, and questions 10 and 11, which gathered numerical data, were aggregated, summarized, and presented quantitatively. Questions 14, 15,18, 19, and 24 revealed recurring patterns and similarities in responses and were subject to thematic analysis. Questions 17, 20, and 23 were approached using a qualitative methodology.

Quantitative data from binary and numerical responses were subjected to descriptive analysis, and mean values and ranges, numbers, and percentages were used where applicable. All calculations were made using Microsoft Excel.

Thematic analysis was applied in the aforementioned questions to enhance clarity and readability of the results. In this regard, similar or identical responses were identified and grouped into themes to facilitate more concise presentation of the qualitative data and allow for clearer identification of prevalent ideas. These themes were then reviewed and adjusted through collaborative discussions among the research team members, for optimal accuracy in presenting the results.

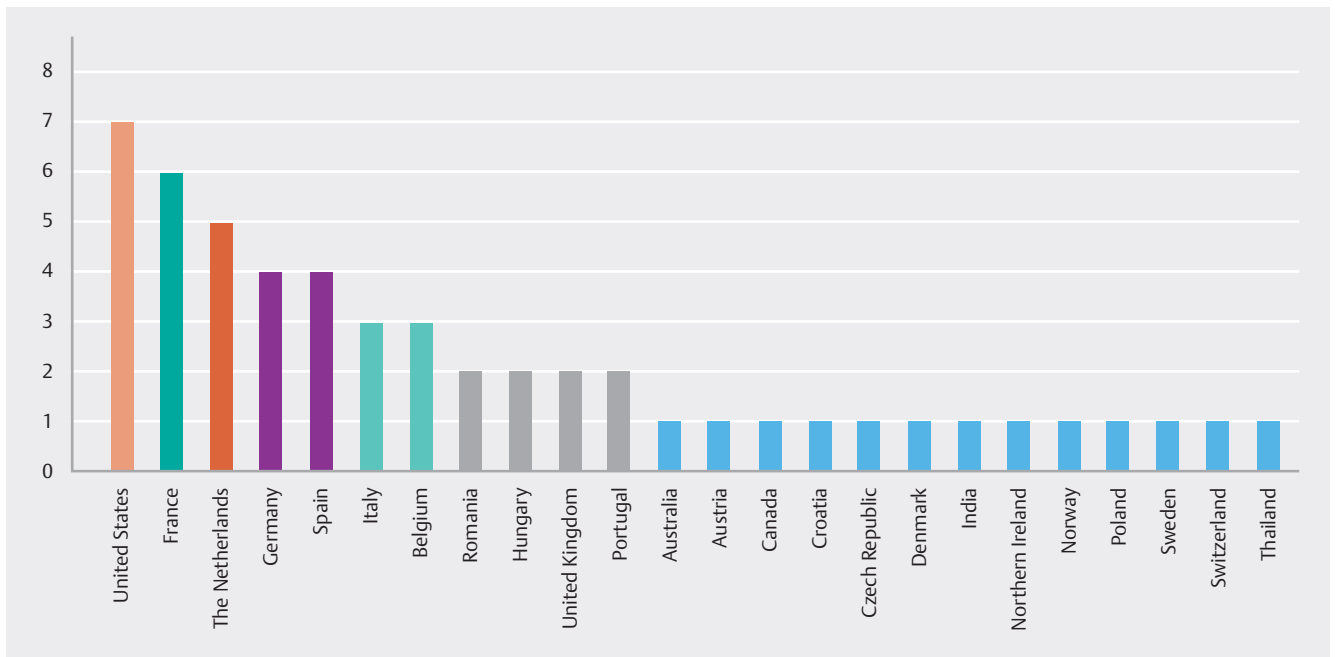
## Results

Fifty-three experts (74.6%) from 24 countries answered the questionnaire. The geographical distribution of respondents to the survey is shown in ► Fig. 1.

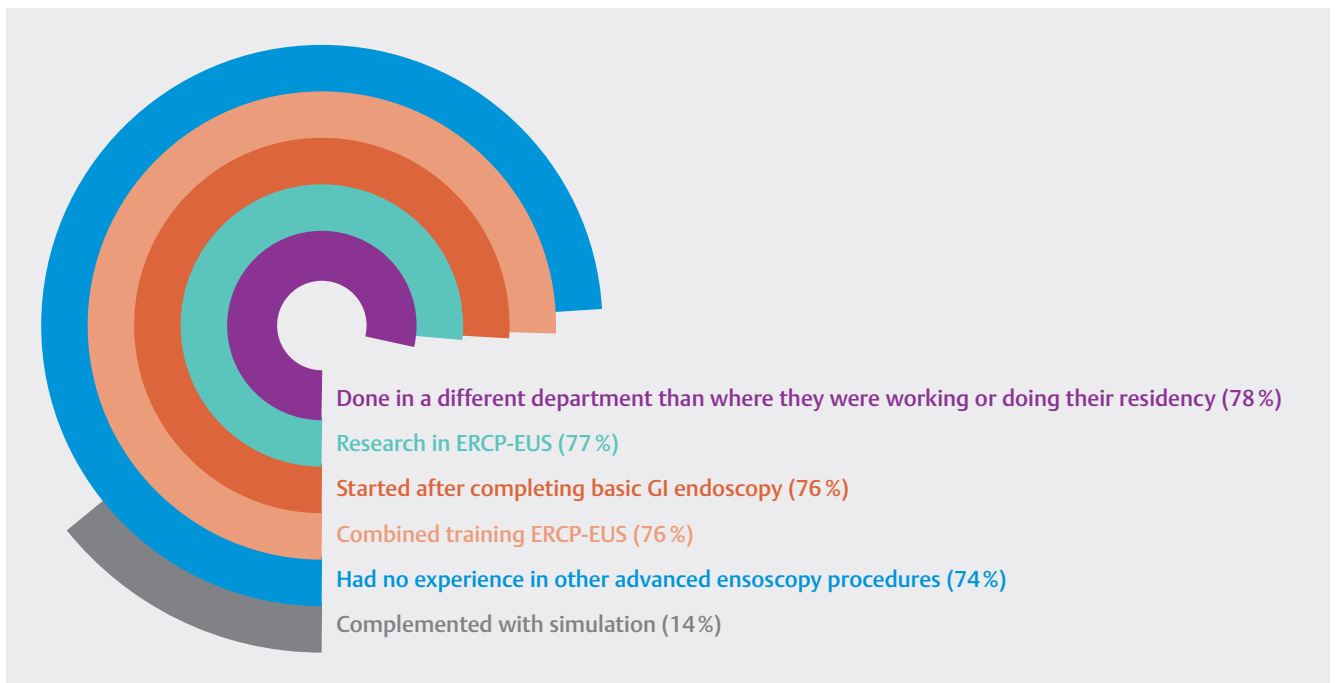
### Training in ERCP and EUS

► Fig. 2 provides the specifics regarding their ERCP training experience.

ERCP training was started early (average age 31 years; range, 24–52 years), following training in basic gastrointestinal endoscopy, and demanded a rather long period of training (average duration 27 months; range, 3–120 months). Most of the experts followed a specific period for ERCP training (81%), which often required moving to another department (78%). ERCP was learned in combination with endoscopic ultrasound (EUS) in most cases (76%), either sequentially (ERCP was frequently learned first) or simultaneously. Following these principles, experts took an average of about 1.5 years (range, immediately after training–5 years) to start performing ERCP/EUS independ-



► **Fig. 1** Geographical distribution of respondents to ERCP/EUS training survey: Australia (n = 1), Austria (n = 1), Belgium (n = 3), Canada (n = 1), Croatia (n = 1), Czech Republic (n = 1), Denmark (n = 1), France (n = 6), Germany (n = 4), Hungary (n = 2), India (n = 1), Italy (n = 3); Northern Ireland (n = 1), Norway (n = 1), Poland (n = 1), Portugal (n = 2), Romania (n = 2), Spain (n = 4), Sweden (n = 1), Switzerland (n = 1), Thailand (n = 1), The Netherlands (n = 5), United Kingdom (n = 2), United States (n = 7).



► **Fig. 2** Specific aspects of experts' ERCP training experience.

ently and about 4 years (range, 1–10 years) to accomplish a total of about 1000 ERCP/EUS procedures (each).

In addition, training was frequently complemented by research, with the goal of going beyond and expanding the limits of knowledge in a certain field. In fact, most experts (77%) de-

veloped research projects in ERCP/EUS while in training, with 72% having completed a PhD thesis (most from European departments) by age 34 (range, 23–49 years old). While most of these PhD theses were done in the field of advanced endoscopy and/or biliopancreatic diseases, some were also done in other

► **Table 1** Best advice given to experts when they were trainees.

Advice	N
“Be careful and concerned with patient safety” “Be resilient and don’t give up”	n = 10 each
“Observe others”	n = 9
“Be patient and take your time”	n = 7
“Be responsible and know your limits”	n = 6
“Work hard”	n = 5
“Keep on learning” “Follow your passion and enjoy what you do” “Check all conditions before starting”	n = 4 each
“Learn from your experience and mistakes” “Get support and create your network” “Stay curious and enthusiastic” “Be competent and diligent” “Get involved in academics, teaching, and research”	n = 3 each
“Be modest and don’t let your ego go too far” “Believe in yourself” “Know your team and be a team player” “Think before you act”	n = 2 each
“Less is more” “Be systematic” “Make your practice your research” “Listen” “Start early” “Stay yourself” “Be committed” “Limit your commitments” “Be positive” “Try to do the best possible” “Dedicate to not only technical but also cognitive ERCP aspects” “Change the strategy after adequate time if your approach has no success” “Focus on the question which has to be answered”	n = 1 each

subjects, such as clinical gastroenterology, hepatology, basic science, or even in experimental ophthalmology or in regenerative stem cells.

### Investments

When asked about the best and most worthwhile investments experts made to develop their skills, “time and practice” (n = 11) were essential for the majority, followed by “observing other experts” (n = 10), “maintaining continuous learning” and “doing a fellowship” (n = 8 each), “choosing the right mentor” (n = 7) and “being involved in research” (n = 6) as the most frequently cited.

Additionally, more than half of the experts developed certain areas outside endoscopy/medicine that they felt were also important to acquire ERCP/EUS technical skills. “Sport” (e.g., sailing, fencing, climbing) (n = 10) was the most frequently mentioned, followed by “research” (e.g., translational, clinical, or bioengineering) (n = 8).

### Advice to be (or not to be) followed

Throughout their paths to success, experts were given a lot of suggestions, some of which were considered useful and others not so much. Experts recalled the best and the worst advice they were given, as shown in this list and ► **Table 1**, respectively.

The best advice experts received during their training are mentioned in ► **Table 1**. Additionally, worst advice given to them when they were trainees included:

- “You are a woman, should you continue?”
- “Don’t consult, you can manage it without help”
- “Go with the flow”
- “This is not a job for you, You will never succeed, Give up”
- “Don’t take risks”
- “Why spend more time in endoscopy? Do surgery instead”
- “Never mind”
- “I give you 5 minutes for cannulation”
- “Don’t bother putting in pancreatic stents for protection against pancreatitis”

- “Don’t learn to scope, you are an academic”
- “Just stick to the endoscopy room”
- “You will never become as good as the one who was really good at ERCP when I started training so deal with it”
- “Choose Internal Medicine instead”
- “It would be better if you do colonoscopy”

## Obstacles

The negative comments that some experts received during their training are a glimpse into the reality that it is not easy to get to the top. Indeed, expanding upon this idea, several obstacles to the entry of these experts into the ERCP field were listed. “Lack of dedicated time for training” (n = 11) and “peer competition” (n = 10) were the biggest obstacles, followed by “lack of resources” (n = 8), “lack of procedure volume” (n = 7), “lack of support” and “time constraints with family” (n = 5 each), “lack of opportunity,” “gender issues,” “lack of structured training,” “procedures complexity” and “difficulty developing research” (n = 3 each), “difficult relation with surgeons,” “bureaucracy issues,” (n = 2 each) and “lack of funding” (n = 1).

Once more, certain attitudes, such as “keeping motivation and resilience,” “humbleness and modesty,” “maintaining training,” and “observing and discussing with colleagues” and having critical thinking skills (e.g., “reflecting, discussing and understanding the failure and learning from it,” “reassessing indications and technique,” “reviewing registered procedures”), helped these experts to overcome these obstacles.

## Quotes to guide professional life

Work life is tough, no doubt about it. To help in guiding professional life, the favorite quotes mentioned by the experts are summarized here:

- “Enjoy each day”
- “Learning is a continuous process”
- “Keep trying” or “Never give up”
- “Always be careful”
- “Strive on and trust!”
- “Failure is not an option” (but can be a decision)
- “*Primum non nocere*”
- “When sailing aimlessly, no wind is favorable”
- “Who does not risk, does not win”
- “Medicine is not a science; it is an art and an imperfect one”
- “I am not what happened to me, I am what I choose to become”
- “The value of the case for the individual patient should be given the highest priority”
- “The failure is when we do not even try it”
- “To someone with a new hammer, everything looks like a nail”
- “Well done is better than well said”
- “You are most likely to be good at what you enjoy”
- “There is no worse teacher than the one who is not overwhelmed by his student”
- “It is not because things are difficult that we do not dare, it is because we do not dare that things are difficult”
- “Do not take yourself too seriously”

- “Cannulate the papilla with the care you would like to get a Foley catheter placed”
- “Hard work pays off”
- “Persistence wears down resistance”
- “To thine own self be true”
- “If you learn, teach; if you get, give”
- “Patients who need ERCP the least are most likely to suffer a complication”

Beyond all the above-mentioned advice, it should also be taken into account that “personal life,” “having the possibility of teaching,” “providing high work quality,” “optimizing your patients’ outcomes” and “developing a good relation with them and your team” and/or “collaborating in gastrointestinal societies,” which are frequently forgotten at more initial stages of professional life, constitute, undeniably, important factors for achieving long-term success in ERCP career.

## Discussion

These study results provide novel insights about the professional trajectory of renowned worldwide ERCP experts, giving valuable advice to help trainees to excel in this field.

Training in ERCP entailed formal and focused training for most of the experts, often incorporating a comprehensive strategy that involved both ERCP and EUS learning and was complemented by active engagement in research activities. The experts demonstrated a significant commitment by dedicating a considerable duration to their training and completing a substantial number of procedures to achieve competence. This commitment aligns with recent guidelines [5], emphasizing the importance of adopting effective and thorough training programs to fulfill the performance measures that have also been launched [6] to ensure that ERCP is performed in a standardized manner and with the appropriate quality it demands. However, it is crucial to acknowledge the evolving landscape of ERCP training. Despite the opportunities and commitment demonstrated by these experts, accomplishing all the requirements of the ERCP training curriculum [5] has become increasingly challenging in current settings [7]. Legal considerations around training on actual patients, alongside increasing procedure complexity due to technological advance, long learning curves to achieve competency in ERCP [3, 8, 9], and lack of validation regarding the relationship between trainee involvement and clinical outcomes in ERCP [10] contribute to these difficulties. Acknowledging these challenges, simulation training, although underutilized by experts, may emerge as a promising solution. Use of simulator-based education is increasing to complement and facilitate this supervised training process, at the same time that it obviates potential patient-related AEs. In a dedicated learning environment and maintaining the feedback from the trainers, this type of training allows the acquisition of skills and competencies at the trainee’s own pace, without increasing procedure times or risks for the patient. Furthermore, simulators can permit the adoption of a “deliberate” practice, a practice that focuses on tasks beyond the trainee’s current level of competence and comfort [11]. As stated by

the top psychologist Anders Ericsson, “It is only by working at what you can’t do that you turn into the expert you want to become” [12]. In fact, contrary to commonly held misconceptions, training should entail specific, considerable, and sustained efforts in skills/steps that the trainee cannot do well, or even at all. In ERCP, although several types of simulator models have been developed [13], they still have limited formal implementation in training programs, due to their specific limitations (anatomical characteristics, price, ethical and logistical demands) [5] and lack of proper validation. The Boškoski-Costamagna ERCP Trainer, which is one of the most appreciated simulation prototypes for ERCP training [14, 15, 16], is currently being validated (ClinicalTrials.gov Identifier: NCT05533944).

Regarding the most valuable investments experts made, “time and practice” were pointed out by the majority. “Practice isn’t the thing you do once you’re good. It is the thing you do that makes you good” [17]. Indeed, it takes time to become an expert. Research has shown that “the most gifted performers need at least ten years (or 10,000 hours) of intense training in a given field before winning international competitions. Specifically in the field of music, the apprenticeship may be even longer, and most elite musicians will need 15 to 25 years of steady practice, on average, before they succeed at the international level” [17]. ERCP is surely no exception. Another crucial investment was the choice of a mentor. Training in ERCP has traditionally adhered to the apprenticeship model, a method rooted in experiential learning on actual patients [7]. First described by Pratt and Johnson [18], this model, especially prevalent in teaching motor skills, is characterized by the principle of “learning by doing.” It is a common approach in vocational training, where a seasoned endoscopist, designated as the trainer, serves as a model for behavior. The trainee, in turn, attempts to replicate the demonstrated skills, receiving constructive feedback from the trainer. In ERCP, the importance of “choosing the right mentor,” highlighted in survey responses, is pivotal. The mentor shapes not only technical expertise, but also cognitive and integrative skills, guiding decision-making, procedure intricacies, and nuanced patient care. Emphasizing “choosing the right mentor” underscores the profound impact of mentorship on ERCP expertise development. A mentor who provides targeted, constructive feedback becomes a vital asset, significantly influencing the trainee’s professional trajectory.

Concerning areas outside endoscopy, the importance of sports to skills development should be highlighted. As one of the experts explained, “sports teach you to manage performance anxiety and stress, change in tactics, and mental flexibility.” Indeed, sports can mean much more than physical development. They can help you learn to focus and create a positive attitude toward life and its struggles, and build character traits such as perseverance, determination, commitment, equanimity, fair play and team spirit, leadership skills, strategic and analytical thinking, goal-setting and risk-taking [19]. As also observed in the section on “advice to be followed,” these are the same characteristics that experts consider to be crucial for excelling in a complex field like ERCP, which is also demanding and involves high-pressure situations and the ability to deal with the unforeseen. Interestingly, several experts have also engaged in

research spanning translational and bioengineering domains. Translational research facilitates seamless integration of bench-to-bedside knowledge, bridging the gap between scientific discoveries and practical applications in patient care. The incorporation of bioengineering reflects a commitment to advancing technologies and methodologies. This holistic research endeavor aligns with the experts’ aspiration to continually elevate the standards of care in ERCP, contributing to both the scientific understanding and the practical advancements in this field.

The insights gleaned from experts’ experiences as trainees offer additional valuable guidance for those navigating the field of ERCP. The “best advice” emphasizes fundamental principles crucial for professional growth. The best advice experts can give to their trainees was “be careful and concerned with patient safety.” The patient should always be the focus. For the specific purpose of excelling in ERCP, preparation for this kind of procedure should start, ideally, the day before the procedure, by talking to the patient, and, if necessary, the relatives. It is essential to create a good doctor-patient relationship, and to ensure that all technical conditions, such as checking the indication and reviewing all the clinical history, blood tests, and imaging, are satisfied. “Make a plan, check the devices and be prepared” [20]. Planning the procedure and checking the availability and proper functioning of the devices should be done routinely. ERCP is a risky procedure with several potential related AEs that could potentially be severe [4]. It is important to be aware of AEs, adopt all recognized preventive measures, and know how to act accordingly to treat them, when needed. As mentioned by one of the experts, “ERCP is an opportunity to analyze a clinical history and provide an advice or a plan for future management.” Furthermore, being in the ERCP room should not be reduced to “simply watching a procedure.” We can learn a lot from assuming an active presence in the room and asking reasonable questions, watching the hands of the operator (not only the screen!), learning how to use the accessories and reviewing ERCP imaging, among others. After the procedure, and as experts well recalled, you should take your time to carefully reflect on the successes, but also on the failures. It is important to devise plans to keep improving. David Allen Kolb, a well-known American educational theorist, argues that “learning is the process whereby knowledge is created through the transformation of experience” [21]. Kolb’s experiential learning style theory is characterized by a four-stage learning cycle in which the learner “touches all the bases.” In the case of ERCP, the trainee is primarily subject to a new and unknown situation in the ERCP room. This novel and “concrete experience” should be followed by a time for reflection, a “reflective observation of the new experience,” so that the trainee can reach the third stage, the so-called “abstract conceptualization” stage. In other words, it is the possibility of developing critical thinking that will enable the construction of new connections between different concepts and the interconnection of knowledge. In the end, it is this type of experience that will enable the trainee to succeed when faced with different circumstances, the “active experimentation” stage. In the end, “always be responsible”! The day after the procedure, it is man-



datory to check on how the patient is doing, whether there have been any AEs and, if so, trainees should be involved in the treatment.

Besides prioritizing patient safety, other recommendations given by the experts, such as cultivating resilience, underscore the core values integral to mastering ERCP. Observational learning, responsibility awareness, and continuous self-improvement are recurrent themes and have been acknowledged recently [22]. Indeed, this study published by our team underscores the high importance of a trainee possessing non-technical skills to achieve success in ERCP, in addition to the technical skills traditionally associated with the high performance of an endoscopist. Conversely, the worst advice, marked by gender bias and discouragement, reveals the resilience exhibited by our experts, defying these challenges, as well as the need to overcome stereotypes and create an inclusive environment for learning that ensures equal opportunities for trainees to thrive in this field. The dichotomy between constructive and detrimental advice served as a compelling reflection on the varied experiences encountered during the formative stages of ERCP training.

“Personal life” was, undoubtedly, the factor most frequently mentioned by the experts, and which is in line with Gladwell [17], who argues that it is the supportive relationships people build and who they are outside their jobs that define the future professionals they will become. Expert opinion!

The study type is one of this study's limitations. An analysis based on expert opinion has a low grade of evidence. However, the objective of the study was precisely to collect personal accounts, in an open-answer format, about the choices, beliefs, and experiences of those who excelled in this field. It is natural to strive for success, and to the authors' knowledge, there are no other similar papers in the literature. Our methodology was chosen because, in the absence of previous studies in this field, aside from creating a multiple-choice survey (e.g.), this format allowed the experts to better express their ideas and the authors to capture as much information as possible. Moreover, we acknowledge that the thematic grouping linked to some of the answers, while it enhances readability, may also: potentially have led to a loss of detailed nuances within individual responses; be inherently subjective, although that was reduced by collaborative discussions among the research team about minimizing individual biases; and has potential implications for data interpretation. An additional limitation was that there were no objective criteria to define expertise in ERCP. Instead, experts were suggested by peer recognition. This method of identifying experts introduces inherent subjectivity. In addition, despite intentional efforts to include a broad spectrum of expertise, there might be a bias in the representativeness of expertise. Finally, a consideration in the expert selection process is potential bias in peer recognition, where some experts may be more widely acknowledged than others, which may impact the diversity of perspectives reflected in the survey responses.

## Conclusions

Despite these limitations, this ERCP *vade mecum* constitutes a valuable resource for individuals seeking success in the field. ERCP is a technically demanding procedure, and a long process is required to develop competence. There are no shortcuts. Trainees who train in ERCP should be selected from among those who are likely to achieve proficiency and will make good use of the valuable skills. Adopting a structured and rigorous ERCP training program, engaging in deliberate practice, and following good examples, such as the ones discussed in this paper, will surely contribute to an individual's success in performing ERCP. In the end, “Experts are always made, not born” [23]!

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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