

Quality of reporting in endoscopic ultrasound: Results of an international multicenter survey (the QUOREUS study)



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ABSTRACT

Background and study aims The endoscopic report has a key role in quality improvement for gastrointestinal endoscopy. High quality standards have been set by the endoscopic societies in this field. Unlike other digestive endoscopy procedures, the quality of reporting in endoscopic ultrasound (EUS) has not been thoroughly evaluated and a reference standard is lacking.

Methods We performed an international online survey concerning the attitudes of endosonographers towards EUS reports in order to understand the needs for standardization and quality improvement. Endosonographers from different countries and institutional setting, with varying case volume and experience were invited to take part to complete a structured questionnaire.

Results We collected replies from 171 endosonographers. Overall analysis of results according to case volume, experience and working environment of respondents (academic, public hospital, private) are provided. In brief, everyone agreed on the need for standardization of EUS reporting. The use of minimal standard terminology and a structured tree with mandatory items was considered of primary importance. Image documentation was also deemed fundamental in complementing EUS reports both for patient documentation and research purposes. A strong demand for connection and consultation among endosonographers for clinical and training needs was also found. In this respect, a formal expert consultation network was advocated in order to improve the quality of reporting in EUS.

Conclusions Our survey showed a strong agreement among endosonographers who expressed the need for a standardization in order to improve the report and, as a consequence, the quality of EUS.

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Bibliography

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Introduction

A well-written report is the most important way of communication between clinicians, referring doctors and patients. Appropriate construction, clarity, and clinical focus of medical documentation are essential to high-quality patient care.

Reports play a key role for quality improvement in digestive endoscopy, too [1]. All endoscopic procedures should be systematically documented and completely legible in endoscopic reports [2,3]. In this regard, endoscopic scientific societies have issued recommendations for standardizing reports and overcoming the wide variability that still exists. Indeed, heterogeneity has been recognized as the main source of incompleteness and mistakes in reporting [4–6].

A good endoscopic report should rely upon minimal standard terminology (MST) [6–8], structured trees, and image documentation for each procedure [9]. In this respect, electronic health records for endoscopy are very helpful. Current softwares allow saving text with mandatory fields, images and videos into a database that can always be available for medical, statistical, research and legal purposes [10–12].

Unlike digestive endoscopy, the quality of reporting in endoscopic ultrasound (EUS) has not been thoroughly evaluated and a reference standard is lacking [13–17]. EUS is a complex technique with several diagnostic and therapeutic applications [18–24]. Due to this heterogeneity, it is essential to share validated criteria and items for EUS reporting.

We performed an international online survey to assess the routine of endosonographers in EUS reports and understand the needs for standardization and quality improvement in this particular field.

Methods

Study design

Physicians involved in EUS were invited to take part to a web-based survey and complete an online questionnaire. The invitation was sent by email to all physicians affiliated with the European Group for Endoscopic Ultrasonography (EGEUS). Recipients were asked to forward the invitation to colleagues who may have not been reached by the first invitation. The survey remained accessible online from July 2017 to July 2019. Trainees and gastroenterologists during post-graduate school were excluded.

After acceptance, the participants received a link to a dedicated online questionnaire. Survey responses were anonymously recorded by the internet site SurveyMonkey.com, which allows qualitative and descriptive analysis.

Questionnaire

After requests for general information about the geographic area, institutional setting and EUS experience, the questionnaire consisted of 25 itemized questions subdivided into four sections: 1 writing EUS reports (7 questions); 2 EUS iconographic documentation (7 questions); 3 quality improvement of EUS reports (7 questions); and 4 EUS report structure (4 questions). A final blank field was available for suggestions.

Statistical analysis

All qualitative results were expressed as number and percentage. Subgroup analysis was done according to institutional setting, namely academic institution (AI), public hospital (PH), and private practice (PP), operator's experience (≤ 5 or > 5 years) and yearly examination volume (≤ 500 or > 500 procedures). For the comparisons between groups we used either Fisher exact test (2×2) or Chi-squared test when appropriate. $P < 0.05$ was considered statistically significant. We used MedCalc package for Windows (version 19) for statistical analysis.

Results

General information

Surveys were sent to all physicians practicing EUS known by the authors; recipients were also asked to contribute to further spreading of the questionnaire to other endosonographers. Invaluable support was also given by the European Groups for Endoscopic Ultrasonography (EGEUS), which distributed the questionnaire to the member societies. After exclusion of incomplete responses, 171 questionnaires came back available for analysis. Most of the respondents were from Europe (75%), the remainders were from Asia (13%), North America (6%), South America (5%) and Africa (1%).

Among all the physicians who responded, 36% were employed in academic institutions, 45% in public hospitals and 19% in private practice. Subgroup analysis according to institutional settings are reported in **Supplementary Table 1**.

The majority of participants (77%) performed ≤ 500 EUS procedures per year and 23% performed > 500 procedures per year (**Supplementary Table 2**). Most of the respondents were experienced in EUS; in detail, 73% had been performing EUS for more than 5 years (**Supplementary Table 3**).

In detail, physicians working in AI and PH reported greater personal experience and yearly volume of examinations than those in PP ($P < 0.001$ and $P < 0.001$, respectively); similarly, yearly volumes of examinations per center were higher in AI and PH than PP ($P = 0.002$). Moreover, respondents with > 5 years of experience reported higher number of yearly procedures both per operator and per center ($P < 0.001$).

The annual volume of examinations was equally distributed between centers performing more than 500 procedures (47%) and those performing less or equal to 500 procedures (53%). The number of endosonographers was homogeneous among centers with just one operator (21%), two operators (37%), three operators (21%), and more than three operators (21%).

In the following sections only the most relevant results are reported, which is why figures may not always round up to 100%. Complete results are reported in **Table 1** and **Supplementary Tables**.

Section 1: Writing EUS reports

Most of physicians (85%) typed the report by themselves while 10% used a dictation system (5% gave other answers). Dictation was more common in PP as opposed to AI and PH (25% vs. 3% and 9%, respectively; $P = 0.005$). The majority of operators

► **Table 1** Complete results of QUOREUS study (respondents, n = 171).

General information		
Please tell us your institutional setting:	▪ Academic institution	62 (36.3%)
	▪ Public hospital	77 (45.0%)
	▪ Private practice	32 (18.7%)
How many EUS procedures do you perform personally per year?	▪ ≤ 500 exams	132 (77.2%)
	▪ > 500 exams	39 (22.8%)
How many years have you been performing EUS?	▪ ≤ 5 years	47 (27.5%)
	▪ > 5 years	124 (72.5%)
How many EUS procedures are performed at your center?	▪ ≤ 500 exams	91 (53.2%)
	▪ > 500 exams	80 (46.8%)
How many endosonographers are there in your center?	▪ 1	36 (21.1%)
	▪ 2	64 (37.4%)
	▪ 3	36 (21.1%)
	▪ >3	35 (20.5%)
Writing EUS reports		
Q1-1: Do you personally write the report?	▪ Yes, I type it	145 (84.8%)
	▪ No, I dictate it	17 (9.9%)
	▪ Other answers	9 (5.3%)
Q1-2: When do you take care of the report?	▪ At the end of each procedure	158 (92.4%)
	▪ At the end of EUS session	11 (6.4%)
	▪ On another day	2 (1.2%)
Q1-3: Does the patient receive a report after the exam?	▪ Yes, before leaving the hospital	105 (61.4%)
	▪ Yes, but on a different day	14 (8.2%)
	▪ Yes, and a copy is mailed only to the referring physician too	25 (14.6%)
	▪ No, it is mailed only to the referring physician	27 (15.8%)
Q1-4: Do you talk to the patient to provide additional explanations?	▪ Yes, always	138 (80.7%)
	▪ Yes, but only if requested	32 (18.7%)
	▪ No	1 (0.6%)
Q1-4.1: Do you preferentially do it:	▪ On the same day	158 (93.5%)
	▪ On a different day	11 (6.5%)
Q1-5: Do you use an Electronic Health Record to write your report?	▪ Yes	129 (75.4%)
	▪ No	42 (24.6%)
Q1-6: Is your report visible by others via LAN or Web?	▪ Yes, from all doctors in my unit	28 (16.4%)
	▪ Yes, from all doctors in my hospital	103 (60.2%)
	▪ Yes, from all doctors in my regional area	17 (9.9%)
	▪ Yes, from all doctors in my Country	3 (1.8%)
	▪ No	27 (15.8%)

used to write the report at the end of each procedure (92%) and just a few of them at the end of the session (6%); only 1% declared writing the report on another day.

The EUS report was given to the patients in 84% of cases, and a copy was also mailed to the referring physicians in 15% of cases; however, in 16% of cases the report was only mailed to the referring physicians. While 80% of respondents stated

► **Table 1** (Continuation)

EUS iconographic documentation		
Q2-1 ¹ : Do you save still pictures of the exam?	▪ Yes, print images	68 (39.8%)
	▪ Yes, digital images	124 (72.5%)
	▪ No	5 (2.9%)
Q2-2: Do you routinely record videos of the exam?	▪ Yes, I record the whole procedure	19 (11.1%)
	▪ Yes, I record just selected parts	33 (19.3%)
	▪ No, but I record the interesting cases	87 (50.9%)
	▪ No, I do not record videos	33 (19.3%)
Q2-2.1 ¹ : If you save videos, in which format?	▪ PC video files (MPEG, AVI, etc.)	123 (71.9%)
	▪ DVD/digital recorder	50 (29.2%)
	▪ Analogic recorder	9 (5.3%)
Q2-3: Does the patient receive images of the exam along with the text?	▪ Yes, with figure legends	51 (29.8%)
	▪ Yes, without figure legends	56 (32.7%)
	▪ No, he receives just the text	65 (38.0%)
Q2-4: Does the patient receive a video of the exam?	▪ Yes	2 (1.2%)
	▪ Only upon request	34 (19.9%)
	▪ No	135 (78.9%)
Q2-4.1: In which format?	▪ CD	12 (33.3%)
	▪ DVD	19 (52.8%)
	▪ USB key	13 (36.1%)
Q2-5: Do you think it would be important to provide a video to the patient in the future?	▪ Yes	68 (50.4%)
	▪ No	67 (49.6%)
Improving quality of reporting		
Q3-1: Do you review the video of the examination before writing the report?	▪ Yes, always	22 (12.9%)
	▪ Only in selected classes	88 (51.5%)
	▪ No	61 (35.7%)
Q3-2: Do you think that reviewing the videos of EUS examination routinely before writing the report could be useful?	▪ Yes, it could improve diagnostic and/or staging accuracy	72 (48.3%)
	▪ No	78 (52.3%)
Q3-2.1: What prevents you from doing it?	▪ Lack of time	87 (58.8%)
	▪ Lack of time	26 (17.6%)
	▪ I do not record videos	42 (28.4%)
Q3-3: Do you look for consultation with colleagues from your center before writing the report?	▪ Yes, routinely	9 (5.3%)
	▪ Yes, but only in difficult cases	92 (54.1%)
	▪ No	69 (40.6%)
Q3-4: Do you look for consultation with colleagues from another center before writing the report?	▪ Yes, I send pictures by email	21 (12.4%)
	▪ Yes, I send videos by email	11 (6.5%)
	▪ Yes, I bring personally the documentation to the colleague	11 (6.5%)
	▪ No	127 (74.7%)
Q3-4.1: How often do you do it per year?	▪ 1-3 cases	24 (55.8%)
	▪ 4-10 cases	15 (34.9%)
	▪ > 10 cases	4 (9.3%)

► Table 1 (Continuation)		
Q3–5: Do you think that a formally organized consultation system could be useful?	▪ Yes, it should be provided by scientific societies	63 (37.1%)
	▪ Yes, it should be provided by EUS experts on an individual basis	75 (44.1%)
	▪ No, it is enough to have it on a personal relationship	32 (18.8%)
EUS report structure		
Q4–1: Do you write the report according to a structured tree?	▪ Yes, I describe both normal and abnormal findings	138 (81.2%)
	▪ Yes, but I describe only abnormal findings	12 (7.1%)
	▪ No, my report changes on an individual basis	20 (11.8%)
Q4–2: Do you think that a minimal standard terminology could be useful?	▪ Yes, and it should appear on the report	150 (88.2%)
	▪ Yes, but it should be used for statistics and should not appear on the report	13 (7.6%)
	▪ No	7 (4.1%)
Q4–3: Do you think that a structured report with compulsory items should be used in EUS?	▪ Yes, it should be quite detailed and it should be different according to indication	126 (74.1%)
	▪ Yes, but it should be a generic format to be used as a reference	33 (19.4%)
	▪ No, each one should write the report according to personal or institutional routine	11 (6.5%)
Q4–4 ¹ : Which of the following items are included in your report?	▪ Indication	152 (89.4%)
	▪ Type of sedation	153 (90.0%)
	▪ Type of instrument	152 (89.4%)
	▪ Echoendoscope reprocessing data	47 (27.6%)
	▪ Descriptive report	168 (98.8%)
	▪ Conclusive remarks	167 (98.2%)
	▪ TNM staging	157 (92.4%)
	▪ Advice for EUS follow-up	149 (87.6%)
	▪ Nurses name	84 (49.4%)
	▪ Vital parameters	45 (26.5%)
	▪ FNA or therapeutic procedure	16 (9.4%)
	▪ Complications	5 (2.9%)
	▪ Non-EUS Follow-up	9 (5.3%)
▪ Referring physician	3 (1.8%)	
EUS, endoscopic ultrasound; FNA, fine-needle aspiration ¹ Multiple answers allowed.		

that they always gave oral explanations to patients together with the report, 19% used to do it only upon request.

Three out of four clinicians who responded utilized electronic health records, which were more frequently available in AI and PH compared to PP (74% and 82% vs. 63%, respectively; $P < 0.001$). In most cases the report was accessible to other doctors via Local Area Network or Web from the same unit/hospital (77%), the regional area (10%) or the entire Country (2%).

Section 2: EUS iconographic documentation

EUS pictures were stored in a digital format by 73% of endosonographers; in 40% of cases images were thermally printed, while in 3% of cases reports consisted in text only. Storing digi-

tal images was more common in AI vs. PH and PP (81% vs. 70% and 63%, respectively; $P = 0.03$). Moreover, endosonographers with greater than 5-year experience were more used to store digital images than those with shorter experience (78% vs. 57%; $P = 0.03$).

EUS video recording was not available to 19% of all respondents; endosonographers with ≤ 500 exams per year were significantly less likely to record videos (23% vs. 7.7%; $P = 0.004$). However, video recording was significantly more common in AI than PH and PP (92% vs. 74% and 75%, respectively; $P = 0.005$).

Pictures of the EUS examination were attached to the report in 62% of cases, either with or without figure legends. In gener-

al, a video of the EUS examination was not provided to the patients; however, it was available upon request in 20% of cases. As far as projects for the future were regarded, endosonographers with >5 years of experience perceived less important to provide a video to the patients than those with ≤5 years of experience (55% vs. 36%; $P=0.05$). A similar divergence was seen between respondents from AI vs. PH and PP (68% vs. 35% and 52%, respectively; $P=0.003$).

Section 3: Quality improvement of EUS reports

Most of the respondents (59%) were used to review the examination videos before writing the report; of these, 54% did so only in difficult cases but not routinely. Physicians working in PH reported a greater inclination to review videos than those in AI and PP (69% vs. 61% and 59%, respectively; $P<0.001$).

Nevertheless, half of the participants declared that a routine review of the EUS video before writing the report could be useful to improve diagnostic and staging accuracy but they were not allowed to do so due to lack of time. Interestingly, doctors working in PP would be more willing to review videos than those in PH and AI (67% vs. 49% and 38%, respectively; $P=0.04$). Moreover, doctors with ≤5 years of experience were more in favor of video review than those with greater experience (78% vs. 37%; $P<0.001$) as well as those with ≤500 examinations per year compared to those with >500 examinations (57% vs. 20%; $P<0.001$).

Participants sought consultation with a colleague from the same center in 59% of cases and with a colleague from another center (e.g. former mentor, renowned expert) in 25% of cases. Consultation with a colleague from another center was reported more frequently by respondents with inferior experience and procedure volume ($P=0.002$ and $P=0.02$, respectively). Most endosonographers (81%) agreed that a formally organized consultation system could be helpful in this field.

Section 4: EUS report structure

Most endosonographers used a structured tree in the report describing either normal and abnormal findings (81%) or only abnormal findings (7%). Most were in favor of adopting MST either in the report (88%) or for database purpose only (8%).

While a structured report with or without different compulsory items according to the indication was deemed useful by 74% and 19% of respondents, respectively, only 7% preferred writing their reports based on personal or institutional routine.

Discussion

We reported the contributions from 171 endosonographers who responded to our online survey concerning the current quality of EUS report. Overall, we gathered valuable information regarding writing and sharing of reports, handling of photo and video documentation, management of difficult cases, structuring of mandatory items and MST trees, and suggestions for improvement. Moreover, we found some disparities in the attitude towards using digital resources, reviewing videos and seeking online consultation among physicians from different institutional settings such as AI, PH and PP. Differences were

also noted among physicians with different personal case volume and/or years of experience.

The endoscopic report has a key role in quality improvement of gastrointestinal endoscopy. Our scientific societies have provided suggestions to overcome the existing variability, which is the main cause of incompleteness and mistakes. A proper report should be based on MST and a standardized structure of the text and image documentation for each procedure. Electronic health records offer structured reports with mandatory items in order to fulfill all the requirements for setting up a proper patient documentation and storing their data for any future purpose.

Unlike other endoscopic procedures, the quality of reporting in EUS has not been adequately investigated. More than 20 years ago, Aabakken wrote a seminal contribution entitled “Standardized terminology in endoscopic ultrasound” to implement an MST for EUS maintaining that the need for standardization in this field was even more important than in general digestive endoscopy [25]. However, little interest has followed since then. The French society of digestive endoscopy provides formats of EUS report on their internet site (www.sfed.org) that are available only in French and deal only with esophageal and rectal cancer, pancreatic and ampullary cancer, and submucosal tumors.

Our survey provides a snapshot of the current practice in EUS reports around the world. Respondents provided information that is useful to assess the points of strength and weakness of what is already done. Moreover, many suggestions proved useful for future improvement of the quality of EUS report. Scientific societies might be interested in obtaining such information for the benefit of patient care, physician education and scientific research.

It was common belief among our respondents that future EUS reports shall be more structured by adopting mandatory items, structured trees and MST. Moreover, endosonographers with minor experience and case volume wished that more time was available to carefully review the videos of their examinations before writing a report and also to make the videos available to patients. If this practice was implemented, it would imply at least partially rethinking the current routine of our busy endoscopic practices.

In addition, many endosonographers believe that consultation with EUS experts is fundamental to better understand difficult cases before writing a report. In theory, formal consultation could be integrated not only in mentorship programs but also in peer coaching, which is becoming increasingly popular [26].

In our view, the reason for standardizing EUS reports is at least threefold. First, EUS should provide reliable and verifiable information about disease diagnosis and staging, which should come in a readable and reproducible format useful for subsequent care and therapeutic management also by physicians of different specialties. Second, communication among endosonographers from different centers is possible only if patients' EUS reports are always understandable and contain complete information. This might prove essential in particular when EUS-guided fine needle aspiration is repeated at another center

in case of inconclusive or negative previous findings [27]. Third, research and further development of the technique are made possible when the information provided is consistent and correlated with appropriate image documentation as is already the case for radiological procedures.

Conclusions

In conclusion, based on our survey, there is strong agreement among endosonographers on the need for standardization of EUS reports using structured trees and MST. Still images should always be saved in a digital database and become part of the report; video recordings are necessary in selected cases. There is a need for networking and consultation among endosonographers for clinical and educational purposes. In this respect, a formally organized international consultation system would facilitate communication among endosonographers in order to improve the quality of reporting. We are aware that many efforts are needed before standards of reporting in EUS become validated and internationally established. Nevertheless, we believe we have provided a starting point for future studies in view of such a standardization.

Competing interests

The authors declare that they have no conflict of interest.

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