






OPEN ACCESS

JAG consensus statements for training and certification in oesophagogastroduodenoscopy

Keith Siau ^{1,2}, Ian L P Beales,³ Adam Haycock,⁴ Durayd Alzoubaidi ⁵, Rachael Follows,⁶ Rehan Haidry,⁷ Jayan Mannath,⁸ Susan McConnell,⁹ Aravinth Muruganathan,¹⁰ Srivathsan Ravindran ^{11,12}, Stuart A Riley,¹³ R N Williams,¹⁴ Nigel John Trudgill,¹⁵ Andrew M Veitch,^{10,16} On behalf of the Joint Advisory Group on Gastrointestinal Endoscopy (JAG)

For numbered affiliations see end of article.

Correspondence to

Dr Andrew M Veitch; andrew.veitch@nhs.net

Published Online First
24 January 2022

ABSTRACT

Introduction Training and quality assurance in oesophagogastroduodenoscopy (OGD) is important to ensure competent practice. A national evidence-based review was undertaken to update and develop standards and recommendations for OGD training and certification.

Methods Under the oversight of the Joint Advisory Group (JAG), a modified Delphi process was conducted with stakeholder representation from British Society of Gastroenterology, Association of Upper Gastrointestinal Surgeons, trainees and trainers. Recommendations on OGD training and certification were formulated following literature review and appraised using Grading of Recommendations Assessment, Development and Evaluation. These were subjected to electronic voting to achieve consensus. Accepted statements were incorporated into the updated certification pathway.

Results In total, 32 recommendation statements were generated for the following domains: definition of competence (4 statements), acquisition of competence (12 statements), assessment of competence (10 statements) and post-certification support (6 statements). The consensus process led to following certification criteria: (1) performing ≥250 hands-on procedures; (2) attending a JAG-accredited basic skills course; (3) attainment of relevant minimal performance standards defined by British Society of Gastroenterology/Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland, (4) achieving physically unassisted D2 intubation and J-manoeuvre in ≥95% of recent procedures, (5) satisfactory performance in formative and summative direct observation of procedural skills assessments.

Conclusion The JAG standards for diagnostic OGD have been updated following evidence-based consensus. These standards are intended to support training, improve competency assessment to uphold standards of practice and provide support to the newly-independent practitioner.

INTRODUCTION

Oesophagogastroduodenoscopy (OGD) is the single most commonly performed endoscopic procedure in the UK, with over 1 million procedures per year.¹ Over the last decade, ongoing efforts to improve quality of OGD worldwide have been driven by the high rates of post-endoscopy upper gastrointestinal cancer (PEUGIC), improvements in colonoscopy outcomes and increasing expectations by patients to receive high quality endoscopy.² These have included the development of national quality standards which define the requirements for competent OGD practice.³

Pivotal to quality assurance in endoscopy is training and certification. In the UK, the Joint Advisory Group in Gastrointestinal Endoscopy (JAG) oversees endoscopy training and certification.⁴ Certification is a standardised process which formally credentials a trainee for independent and unsupervised endoscopy nationwide.⁵ The JAG OGD certification process was originally formulated in 2011 based on pragmatism, in an era where evidence and quality standards on OGD training were lacking. With the development of national quality standards, and the increasing body of evidence relevant to OGD training, there



► <http://dx.doi.org/10.1136/flgastro-2021-101946>



Check for updates

© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Siau K, Beales ILP, Haycock A, et al. *Frontline Gastroenterology* 2022;**13**:193–205.

Guidelines

was a call to review the existing certification pathways in endoscopy.

Following consultation with UK Specialist Advisory Committees, a committee was assembled by JAG and its stakeholders, including the British Society of Gastroenterology (BSG) and the Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland (AUGIS), to develop evidence and consensus-based recommendations relevant to training and certification in diagnostic OGD. The aim was to develop a robust set of recommendations which would form the framework of OGD certification within the UK. Specifically, recommendations were made on the following areas: (1) definition of competence, (2) acquisition of competence, (3) assessment of competence and (4) post-certification support.

The following aspects were considered beyond the scope of this guideline:

- ▶ Paediatric OGD.
- ▶ Therapeutics, for example, upper gastrointestinal (GI) bleeding.
- ▶ Optical diagnosis.
- ▶ Barrett's oesophagus.

METHODS

Guideline development

A modified DELPHI process was commissioned by the JAG Quality Assurance of Training Working Group, with inclusion of JAG, BSG, AUGIS, training leads and trainee members, nursing and medical representatives and including representation from England, Wales, Scotland and Northern Ireland. Through a series of teleconferences, participants were allocated to four working groups based on the scope of the guideline. Each working group was tasked with framing questions relevant to training and certification, using a Population, Intervention, Comparator, Outcome format where possible. Literature searches were then systematically conducted in major databases including Embase, MEDLINE, PubMed and the Cochrane Database of Systematic Reviews. Results were collated and summarised into recommendation statements; these were appraised using the Grading of Recommendations Assessment, Development and Evaluations (GRADE) framework.⁶ The level of evidence and strength of recommendation were provided for each statement. Although it is standard practice to align recommendations with the level of evidence, statements could receive discordant recommendations (eg, strong recommendation for low quality evidence) if, on balance, the perceived benefit outweighed the paucity of available evidence.

Consensus process

An anonymised, electronic voting process was undertaken during a face-to-face meeting to measure consensus with recommendation statements. Five Likert scale responses were provided for each

statement (Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree and Strongly Agree), with Agree and Strongly Agree indicating agreement with a statement. 80%+ agreement was specified *a priori* as a threshold to accept a statement. For statements that were not accepted, up to three rounds of revisions and re-voting were permitted before they were rejected. On collation of the accepted statements, the document was sent to stakeholder groups for review. Accepted statements were then integrated into the final OGD certification pathway.

RECOMMENDATION STATEMENTS

In total, 32 recommendation statements were generated for the following domains: definition of competence (4 statements), acquisition of competence (12 statements), assessment of competence (10 statements) and post-certification support (6 statements). These are summarised in [table 1](#).

Defining competence

1.1: Competence in diagnostic OGD is defined as the ability to perform procedures effectively and safely to national standards.

Evidence: **Very low**; Recommendation: **Strong**;
Agreement: **100%**

Competence in OGD refers to the ability to perform the procedure effectively and safely to defined minimum standards, across a spectrum of cases and contexts. In the UK, the individual competencies are defined within the upper GI DOPS assessment form and the minimum standards defined are stipulated within the 2017 BSG and AUGIS quality standards document.³ It should be noted that competence does not necessarily equate with expertise; it is therefore essential for a practitioner to develop his or her skills beyond the minimum standard of competence. Competence also needs to be maintained; this may encompass a certain minimum case volume, continuous professional development and measurement of performance by key performance indicators (KPIs).

1.2: Competence in OGD will include attainment of relevant minimal performance standards as currently defined by BSG/AUGIS.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

1.3: Competence in OGD should include procedural completion, defined as D2 intubation and J-manoeuvre, in at least 95% of procedures.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **91%**

Prior to this document, JAG criteria for certification included only two measures of competence in OGD: ability to reach the second part of the duodenum unassisted in $\geq 95\%$ cases, and ability to perform a J-manoeuvre unassisted in $\geq 95\%$ cases.

Table 1 Summary of recommendation statements for training and certification in OGD.

| Recommendation statement | | Level of evidence | Strength of recommendation |
|--------------------------|--|-------------------|----------------------------|
| 1.1 | Competence in diagnostic OGD is defined as the ability to perform procedures effectively and safely to national standards. | Very low | Strong |
| 1.2 | Competence in OGD will include attainment of relevant minimal performance standards as currently defined by BSG/AUGIS. | Low | Strong |
| 1.3 | Competence in OGD should include procedural completion, defined as D2 intubation and J-manoeuvre, in at least 95% of procedures. | Low | Strong |
| 1.4 | Competence in OGD will include attainment of additional standards of performance defined in this document, including preprocedural, procedural, postprocedural and endoscopic non-technical skills. | Low | Strong |
| 2.1 | Training should take place in a unit that is accredited for endoscopy training. | Very low | Strong |
| 2.2 | Training procedures should be uploaded onto the National Endoscopy Database. | Very low | Strong |
| 2.3 | Simulation training may be used to enhance the earlier development of technical skills but cannot currently be used as a substitute for more traditional skills and decision-making training. | Moderate | Weak |
| 2.4 | Trainees should attend the JAG Basic Skills in OGD course prior to certification, ideally during early training. | Very low | Strong |
| 2.5 | Trainees should only undertake the JAG basic OGD course when continued regular training at their base unit is confirmed. | Very low | Weak |
| 2.6 | Trainees should use a wide range of resources to support OGD training. | Low | Strong |
| 2.7 | Training resources should be developed to support competency acquisition in lesion recognition. | Low | Strong |
| 2.8 | Training resources should be developed to support competency acquisition in ENTS. | Low | Strong |
| 2.9 | Trainees should have access to a wide range of case-mix to enhance training in pathology recognition, periprocedural management and ENTS. | Very low | Strong |
| 2.10 | 250 procedures should be the minimum required before eligibility for summative assessment, assuming all other metrics are satisfactory. | Low | Strong |
| 2.11 | All trainers delivering training in OGD should have taken part in an endoscopy-focused Train-the-Trainers course (eg, TGT/TCT). | Low | Strong |
| 2.12 | Trainees must complete a reflection tool on JETS every 50 procedures. This forms a framework for meetings with their endoscopy supervisor every 6 months or less. | Very low | Weak |
| 3.1 | DOPS should be used as the assessment tool for competency in OGD. | Low | Strong |
| 3.2 | DOPS should be mapped to current BSG/AUGIS standards for OGD. | Very low | Strong |
| 3.3 | Total procedure times (with inspection time for surveillance procedures) should be included in the endoscopy report and assessed within DOPS. | Low | Weak |
| 3.4 | Diagnosis specific DOPS should be developed to facilitate competency acquisition and assessment for OGD, for example, Barrett's oesophagus. | Very low | Weak |
| 3.5 | DOPS should record the indication for and diagnosis of the procedure and be linked to the JETS e-portfolio/NED. | Very low | Strong |
| 3.6 | Trainees should have at least one formative DOPS performed per 10 procedures. | Low | Strong |
| 3.7 | Each formative DOPS should be performed on a single preselected case. | Very low | Strong |
| 3.8 | At least three formative DOPS from each of three different observers should be performed over the last 100 cases before summative assessment. | Low | Strong |
| 3.9 | Eligibility for summative assessment in OGD may be triggered once the following are met: 1. Fulfil criteria for BSG standards for competence in OGD. 2. Unassisted D2 intubation and J-manoeuvre rates of $\geq 95\%$ (in the preceding 3 months). 3. Attaining a minimum hands-on procedure count of 250. 4. Attendance of JAG Basic Skills course. 5. Meeting formative DOPS requirements. – Minimum of 25 formative DOPS performed by ≥ 3 different assessors. – Last five DOPS rated competent without supervision for 90%+ of all items. 6. Evidence of engagement with the JETS reflection tool (minimum of 5 reflection entries). | Low | Strong |
| 3.10 | For successful completion of the summative DOPS assessment, the trainee should be rated as 'ready for independent practice' for all items within four DOPS, by two different assessors, neither of whom is their regular assessor. | Very low | Strong |
| 4.1 | Newly certified OGD practitioners should have access to a named supervisor to discuss cases and to review progress. | Very low | Strong |
| 4.2 | The ongoing training requirements of individuals should be identified and practitioners should undertake additional training/ upskilling as defined within their personal development plan. | Very low | Strong |
| 4.3 | Newly certified practitioners may perform OGD without direct supervision, but should have systems in place to ensure appropriate list size and case load selection. | Very low | Strong |
| 4.4 | There should be appropriate mechanisms in place for performance monitoring and review during the early post-certification period. | Low | Strong |
| 4.5 | Significant adverse events should be discussed with the supervisor and reflected on in their appraisal. | Very low | Strong |
| 4.6 | In the post-certification period, newly-independent endoscopists should perform at least 100 procedures a year to maintain competence. | Very low | Strong |

AUGIS, Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland; BSG, British Society of Gastroenterology; DOPS, direct observation of procedural skills; ENTS, endoscopic non-technical skills; JAG, Joint Advisory Group; JETS, JAG endoscopy training system; NED, national endoscopy database; OGD, oesophagogastrroduodenoscopy; PD, program director; TCT, train-colonoscopy-trainer; TGT, train-gastroscopy-trainer.

A minimum procedure number of ≥ 200 had also been mandated. This did not require any defined expertise or assessment in pathology recognition or

management. It is recognised that up to 11.3% of upper GI cancers cases may have had a previously normal OGD in the preceding 3 years.⁷ This might

Guidelines

be explained by failure to diagnose early cancers or premalignant pathology at OGD, either due to an inadequate examination, or due to a lack of knowledge of the appearance of such pathology. In colonoscopy, there has been great emphasis on adequate mucosal visualisation to improve adenoma detection rate and reduce post-colonoscopy colorectal cancers. Although premalignant pathology in the upper GI tract is more variable, and the pathways less well defined than the colorectal adenoma–carcinoma sequence, there is an opportunity to detect more relevant pathology than is currently the case.^{8 9} To address this issue, the BSG and AUGIS standards were published in 2017 with defined minimum and aspirational standards.³ The JAG OGD standards will be aligned with these minimum standards for competent practice.

1.4: Competence in OGD will include attainment of additional standards of performance defined in this document, including preprocedural, procedural, postprocedural and endoscopic non-technical skills.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

In addition to technical endoscopic competencies, all trainees should be competent in peri-procedural aspects of endoscopy. These may be preprocedural (to include consent, sedation, etc), procedural (technical and cognitive elements), postprocedural (eg, report writing) and endoscopic non-technical skills (ENTS). These aspects are measured and detailed within direct observation of procedural skills (DOPS) assessments, which include descriptors of the expected levels of competency.

Acquiring competence

2.1: Training should take place in a unit that is accredited for endoscopy training.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **100%**

There are no published data specifically related to outcomes in training related to JAG-accreditation status of units. However, the processes of quality assurance (QA) of both service and training remain integral to the overall JAG quality framework. The JAG QA process assesses endoscopy units on criteria specifically related to training and the training environment; engagement and benchmarking ensures that standards are maintained and improved.¹⁰

Despite full JAG accreditation, some units will have difficulties providing all the required training to the trainees on site, depending on the number of trainees and subspecialties. In the UK, other specialties such as radiology and histopathology have pioneered a more centralised academy-style training programme with organised training focused in one area, but with

planned networked exposure in other units. Such a system has been used in advanced endoscopy. Full implementation of academy-based training may be challenging for UK gastroenterology trainees due to the competing non-endoscopy demands.^{5 11} A more centralised, organised programme may allow more equitable access to training and experiences. In all situations, a full record of training cases should be maintained by the trainee and all training units within a training network should be JAG accredited.

2.2: Training procedures should be uploaded onto the National Endoscopy Database.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **100%**

The establishment and evolution of the National Endoscopy Database (NED) is an important initiative for UK endoscopy.¹² The data from NED will be used to populate trainees' individual portfolios and ultimately reduce the time required to develop the trainees' JETS portfolios. Accuracy of data input will be essential for accurate recording of training and both trainers and trainees will need to ensure that procedures performed outside the normal endoscopy environment (eg, emergencies in theatre) are captured accurately.

2.3: Simulation training may be used to enhance the earlier development of technical skills but cannot currently be used as a substitute for more traditional skills and decision-making training.

Evidence: **Moderate**; Recommendation: **Weak**; Agreement: **82%**

Prospective randomised controlled studies have shown that endoscopic simulation-based training (SBT) can significantly enhance the trainee performance.^{13–17} This is most evident in the early part of the learning curve for novices and improves scope handling skills.¹⁷ There is no evidence to show that simulation training significantly impacts the rate of acquisition of the more complex cognitive and management tasks,¹⁸ or that simulation reduces the overall number of procedures required to reach overall competence.¹⁹ However, a case-control study of novice endoscopists from the UK found that attendees of a 2-day OGD induction course combining theory and SBT were more likely to achieve JAG certification over the 16-month post-course follow-up period.²⁰ While simulation enhances the early acquisition of technical skills, it should not substitute patient-based endoscopy training.²¹ Such training should be supervised and be associated with specific performance enhancing feedback.^{22 23}

2.4: Trainees should attend the JAG Basic Skills in OGD course prior to certification, ideally during early training.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **91%**

Mandated endoscopy courses are necessary aspects of endoscopy training and skill acquisition that have been stipulated by JAG.²⁴ The JAG Basic Skills in OGD course provides a uniform, structured introduction to OGD, including issues related to indications, safety, ergonomics,²⁵ scope handling,²⁶ sedation and background knowledge. It has been updated to incorporate the additional standards recommended by BSG/AUGIS.³ Other forms of education, including e-learning resources, can enhance acquisition of cognitive skills such as lesion recognition. The JAG QAT Working Group will continue to provide quality assurance of the basic skills course to ensure consistency, validity and currency. Based on colonoscopy data, Basic Skills courses appear to be more useful when attended early during training, that is, probably between 20–70 cases overall.²⁷ As a point of good practice, the trainees, in discussion with their trainers, should plan the timing of the course, within the context of their own personal development plan before starting OGD training. This discussion may well often involve those with a wider remit overseeing the trainees' progress, particularly regional programme directors.

2.5: Trainees should only undertake the JAG basic OGD course when continued regular training at their base unit is confirmed.

Evidence: **Very Low**; Recommendation: **Weak**; Agreement: **82%**

The Basic Skills Course functions as a complement to continued training at base hospitals and it is important that trainees have the opportunity to reinforce their learning from the course with regular hands-on training. The Basic Skills Course should be undertaken when access to training can be continued over the subsequent 3 months at a minimum, with at least one post-course training-list per week.

2.6: Trainees should use a wide range of resources to support OGD training.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

Training on dedicated, purpose-specific lists can improve skills acquisition in endoscopy, as shown by the improvement in dysplasia detection rate and reduction in bleeding and perforation rates in comparison to those without formal training.^{28 29} A variety of other educational resources such as e-learning systems can be beneficial.³⁰ BEST-Academia is a European web-based training platform designed by an expert committee and has been shown to increase detection and delineation of neoplastic lesions in Barrett's oesophagus.³¹ Online tools, textbooks, journals, live endoscopy demonstrations, conferences and hospital multidisciplinary teams (MDTs) and teaching sessions can all contribute to the gaining of competence in trainees. Although resources can be sign-posted, it would be counterproductive

to be too prescriptive. Similarly, it is important that any resources developed for, or advocated to support, learners within JAG-associated programmes are suitably focused on trainee and patient outcomes. This will need to encompass a suitably broad range of endoscopy cases to maximally enhance pathology recognition, decision-making and ENTs.

2.7: Training resources should be developed to support competency acquisition in lesion recognition.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

2.8: Training resources should be developed to support competency acquisition in ENTs.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

2.9: Trainees should have access to a wide range of case-mix to enhance training in pathology recognition, periprocedural management and ENTs.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **100%**

While acquisition of purely technical OGD skills occurs relatively quickly, it takes longer, and a greater number of procedures, to develop the essential skills of lesion recognition, management and ENTs.^{32 33} Currently, the majority of OGD training involves elective outpatient cases, where the incidence of pathology is low. Each trainee should be encouraged to enhance ENTs competency, especially in lesion recognition. Trainers and training units (as well as JAG) are encouraged to develop resources to enhance the development of these skills. Over time, training lists should expand their case-mix to enhance training in pathology recognition and management of a wide range of diagnostic cases, while developing ENTs. This may involve a variety of endoscopy trainers or purpose-specific endoscopy training lists.

There are no data on which to inform any recommendations on desirable timescales for the acquisition of competence in OGD. This is influenced by many variables, including intensity of training.³⁴ Therefore, more intensive training may be favoured within the context of continuous longitudinal endoscopy training, but may not be readily possible in the context of other competing demands for many trainees. The minimum exposure to training should be one specific training list per week. This training list should have the content and number of cases adjusted for the trainee's development, and importantly include time for feedback and DOPS.

It is accepted that ENTs are important for the safe and effective performance of endoscopy. In the UK, acquisition of these skills lags behind the development of the technical skills of scope control.³³ Specific courses and teaching on ENTs has been shown to enhance short-term knowledge performance and recognition of these skills in expert endoscopists and teams.³⁵ Short-term ENTs

Guidelines

training, in conjunction with simulation in novices, has been shown to enhance colonoscopy performance and may be generalisable to OGD.³⁶

2.10: 250 procedures should be the minimum required before eligibility for summative assessment, assuming all other metrics are satisfactory.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

JAG has previously mandated a minimum of 200 OGD procedures as an eligibility criterion for certification. This was based on earlier studies that found that procedural completion can be achieved within this number. Using the GAGES-UE tool for assessment (which measures only clear technical skills), Vassiliou *et al* suggested that the gross technical skills were obtainable by 50 cases.³⁷ A prospective, cross-sectional study by Cass *et al* concluded that gastroenterology and surgical trainees require more than 100 procedures to reach >90% oesophageal intubation rate.³⁸ An earlier UK study found that 187 procedures were required to reach competency in D2 intubation.³⁹ However it is clear that the more complex cognitive and pathology managements skills take longer to acquire than the technical skills required for procedural completion. More recent data from the USA and the UK confirm that the acquisition of the postprocedure technical, cognitive skills and overall global competency often requires 250 or more procedures.^{32 33} Reliable accurate pathology recognition takes longer, requiring 300 procedures in 90% of cases.³² Overall competency, including postprocedure management, was not reached until 225–249 procedures, although preprocedure competencies such as indication and sedation were developed much earlier (100–124 procedures).³³ Technical skills including adequate visualisation of the stomach were acquired at an intermediate rate (150–174 procedures). Therefore, although technical competencies seem to be acquired relatively rapidly, the skills essential for patient management such as ENTS, report writing, pathology recognition and post-endoscopic management require longer.^{32 33} From JAG certification data,⁵ the median number of OGD procedures at the time of summative assessment was 282 (ranging between 245–305 for different specialties), suggesting that most trainees feel comfortable applying for certification after performing considerably more than 200 procedures to gain confidence in the more complex cognitive and management aspects of OGD. Accordingly, the panel recommends that all trainees should have a minimum of 250 hands-on OGD procedures to be eligible for summative assessment.

2.11: All trainers delivering training in OGD should have taken part in an endoscopy-focused Train-the-Trainers course (eg, TGT/TCT).

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

Endoscopy training should ideally be provided by individuals with the requisite skills and behaviours to teach endoscopy effectively, including an awareness of the principles of adult education, best practices in procedural skills education and appropriate use of beneficial educational strategies such as feedback.^{10 40 41} Trainers in OGD should have appropriate training for their role and undertake regular performance review. Ideally, all trainers will have completed an endoscopy-focused Train-the-Trainer's (TTT) course. It is aspirational for trainers to have at least annual appraisal of training performance from peers and trainees,⁴² and undertake formal update training, either as a refresher trainer session or as faculty on a Basic Skills Course, every 5 years. Throughout the UK, many endoscopy trainers provide training in more than one modality. Although attending a Train-Gastroscopy-Trainer (TGT) course is desirable, there is considerable overlap in the educational content of other procedure-specific TTT courses which are transferable to OGD training, and as such, having these credentials would be considered sufficient as an OGD trainer.

There is limited evidence on the effects of training-the-trainer in endoscopy; however studies in the field of surgery have shown that formal training of trainers can result in a significantly higher rating by their learners.⁴³ Having more than one trainer can be beneficial in providing complimentary training and maximising training opportunities. Each trainee should have a specific endoscopy trainer who would directly oversee their development, conduct regular appraisal of progress and plan and document training objectives. This provides the opportunity to discuss learning from adverse events and complications. Appraisal meetings for trainees should take place at least once every 3 months.

2.12: Trainees must complete a reflection tool on JETS every 50 procedures. This forms a framework for meetings with their endoscopy supervisor every 6 months or less

Evidence: **Very low**; Recommendation: **Weak**; Agreement: **100%**

Reflective practice is 'the process whereby an individual thinks analytically about anything relating to their professional practice with the intention of gaining insight and using the lessons learnt to maintain good practice or make improvements where possible'.⁴⁴ As part of endoscopy training, concurrent (while performing the procedure) and facilitative (delayed feedback or debriefing) techniques may be used. Facilitative feedback is particularly used to help the trainee reflect on what happened, analyse

performance and recognise areas of strength and those that need improvement. While students mastering early skills seem to be benefitting from concurrent feedback, performance and learning are enhanced by delayed feedback.^{40 45} Reflective practice is already established in medical and nursing training and in the post-qualification appraisal process, but has not been formalised within endoscopy training.

The use of reflection in practice has been linked to improvements in learning and improve patient safety.⁴⁶ The opportunity to consolidate learning and identify opportunities to improve technique or patient care integrates cognitive and non-cognitive skills,⁴⁷ drawing together elements of best practice from the available literature, tailored to the patient and case. Such reflections allow the inclusion of feedback and learning outcomes from the wider endoscopy team, with focus on the patient and not only on the trainees' experience. Therefore, it is recommended that reflective learning becomes formalised into the OGD training process.

Assessment of competence

3.1: DOPS should be used as the assessment tool for competency in OGD.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

The UK upper GI endoscopy DOPS is a validated tool for assessing competency in upper GI endoscopy. It comprises 34 individual competency items split into six domains, including ENTs. In a UK-wide study involving over 10 000 DOPS assessments by 987 trainees, data on the validity and reliability of DOPS were presented, along with learning curves, competency benchmarks and predictors of competency.^{33 48} From generalisability theory analyses, satisfactory reliability thresholds could be achieved based on different combinations of assessors and assessments.³³

3.2: DOPS should be mapped to current BSG/AUGIS standards for OGD.

Evidence: **Very Low**; Recommendation: **Strong**; Agreement: **100%**

Given that best practice standards in upper GI endoscopy have been stipulated within UK guidelines and endorsed by stakeholder societies,³ the consensus of the working group was to map existing UK upper GI endoscopy standards with those assessed within DOPS to align quality standards with competency measures (online supplemental table 1).

3.3: Total procedure times (with inspection time for surveillance procedures) should be included in the OGD report and assessed within DOPS.

Evidence: **Low**; Recommendation: **Weak**; Agreement: **100%**

The total OGD procedure time has been shown to correlate with diagnostic yield, and a minimum time of 7 min has been suggested in European guidelines.^{49 50} This ensures sufficient time for thorough inspection, washing and the application of antispasmodics and mucolytics where appropriate.⁵¹ The UK BSG/AUGIS standards recommend noting total procedure time for all surveillance procedures; this should be included in the endoscopy report and assessed within DOPS.

3.4: Diagnosis specific DOPS should be developed to facilitate competency acquisition and assessment for OGD, for example, Barrett's oesophagus.

Evidence: **Very Low**; Recommendation: **Weak**; Agreement: **91%**

Surveillance of Barrett's oesophagus is considered a high-risk indication. A systematic review by Visrodia *et al* cited a 1-year PEUGIC rate of 25%.⁵² In recognition of the technical nuances in Barrett's surveillance (eg, mucosal inspection, usual of adjunct, dysplasia assessment, biopsies), the panel favoured the development of formative DOPS specific to Barrett's surveillance to facilitate competency assessment and to ultimately improve endoscopic quality and reduce PEUGIC rates with Barrett's oesophagus.

3.5 DOPS should record the indication for and diagnosis of the procedure and be linked to the JETS e-portfolio/NED.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **91%**

All UK trainees in GI endoscopy are required to register and log training data onto the JETS e-portfolio. This generates KPIs which act as a surrogate measure of competence. The NED project aims to upload trainee-level procedural data from individual endoscopy reporting systems directly to the JETS e-portfolio for QA purposes.¹² This includes procedure-specific outcome data necessary for KPI calculations, for example, indications, diagnoses, therapeutic data, sedation and complications. The OGD DOPS are recorded separately on JETS but do not contain procedural outcome data. Where appropriate, assessment data from DOPS should be linked to procedural outcome data to facilitate QA and research in OGD training.

3.6 Trainees should have at least one formative DOPS performed per 10 procedures.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **91%**

The provision of performance-enhancing feedback is central to supervised endoscopy training and is embedded in the JAG TTT philosophy. The DOPS provide an essential means for focusing the feedback related to procedures as well as mapping

Guidelines

out the learning and development curve for the trainee.⁴⁵ We recommend for a minimum of one DOPS every 10 cases during training. Trainees and trainers are however encouraged to do as many as they feel appropriate.

3.7 Each formative DOPS should be performed on a single preselected case.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **100%**

To minimise selection bias, each DOPS should be performed on a single case prespecified by the trainee or trainer. DOPS should not be retrospectively chosen on a completed case or averaged across cases performed on a list.

3.8 At least three formative DOPS from each of three different observers should be performed over the last 100 cases before summative assessment.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **82%**

Data from the JETS database shows that the reliability of the DOPS varied with the number of observers and the number of DOPS.³³ DOPS from at least three observers are required for adequate reliability for determining competence. Therefore, it is recommended that at least nine DOPS in total, with at least three different observers, be performed in the last 100 cases before deciding to continue to summative assessment. Based on existing requirements, trainees should be competent in the last five DOPS in a minimum of 90% of all assessed items, with none requiring maximal or significant supervision.

Based on the recommendation statements within this document, trainees will only be eligible for summative

3.9: Eligibility for summative assessment in OGD may be triggered once the following are met:

1. Fulfil criteria for BSG standards for competence in OGD.
2. Unassisted D2 intubation and J-manoeuvre rates of $\geq 95\%$ (in the preceding 3 months).
3. Attaining a minimum hands-on procedure count of 250.
4. Attendance of JAG Basic Skills course.
5. Meeting formative DOPS requirements.
 - Minimum of 25 formative DOPS performed by ≥ 3 different assessors.
 - Last five DOPS rated competent without supervision for 90%+ of all items.
6. Evidence of engagement with the JETS reflection tool (minimum of five reflection entries).

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

assessment when they have fulfilled the criteria above (figure 1).

3.10: For successful completion of the summative DOPS assessment, the trainee should be rated as 'ready for independent practice' for all items within four DOPS, by two different assessors, neither of whom is their regular assessor.

Evidence: **Very low**; Recommendation: **Strong**; Agreement: **100%**

All JAG certification pathways require trainees to undertake summative assessment in order to provide robust and objective demonstration of competence to determine readiness for independent practice. To mitigate bias, trainees must perform a total of four summative OGD DOPS and be rated competent in all items by two different assessors, none of whom should be their current main assessor. Assessors should have trainer credentials and should have received formal training in assessing DOPS.

Post-certification support

4.1: Newly certified OGD practitioners should have access to a named supervisor to discuss cases and to review progress.

Evidence: **Very Low**; Recommendation: **Strong**; Agreement: **100%**

In the post-certification period, it is recognised that most newly certified practitioners will require a defined period of supervision (eg, 1 year) and ongoing endoscopy exposure to achieve the outcomes of an experienced practitioner.^{53 54} As such, a newly-certified practitioner should have access to a named supervisor who can review progress and provide advice where needed. Instances where support may be beneficial may include: review of photodocumentation (and indeterminate lesions) and postprocedural management plans. We recommend that such arrangements should be made with a named supervisor on a regular basis to safeguard patient management and to facilitate skills development. The supervisor should possess valid trainer credentials, that is, recognised OGD trainer and have attended a TTT course.

4.2: The ongoing training requirements of individuals should be identified and practitioners should undertake additional training/upskilling as defined within their personal development plan.

Evidence: **Very Low**; Recommendation: **Strong**; Agreement: **100%**

In endoscopy, the path from competent to high-quality practice involves an ongoing learning curve post-certification. We recommend that, as part of professional development, the training requirements of newly-certified endoscopists should be identified, discussed and recorded. For OGD, this could include lesion characterisation training, for example, Barrett's

JAG Pathway for Training and Certification in OGD

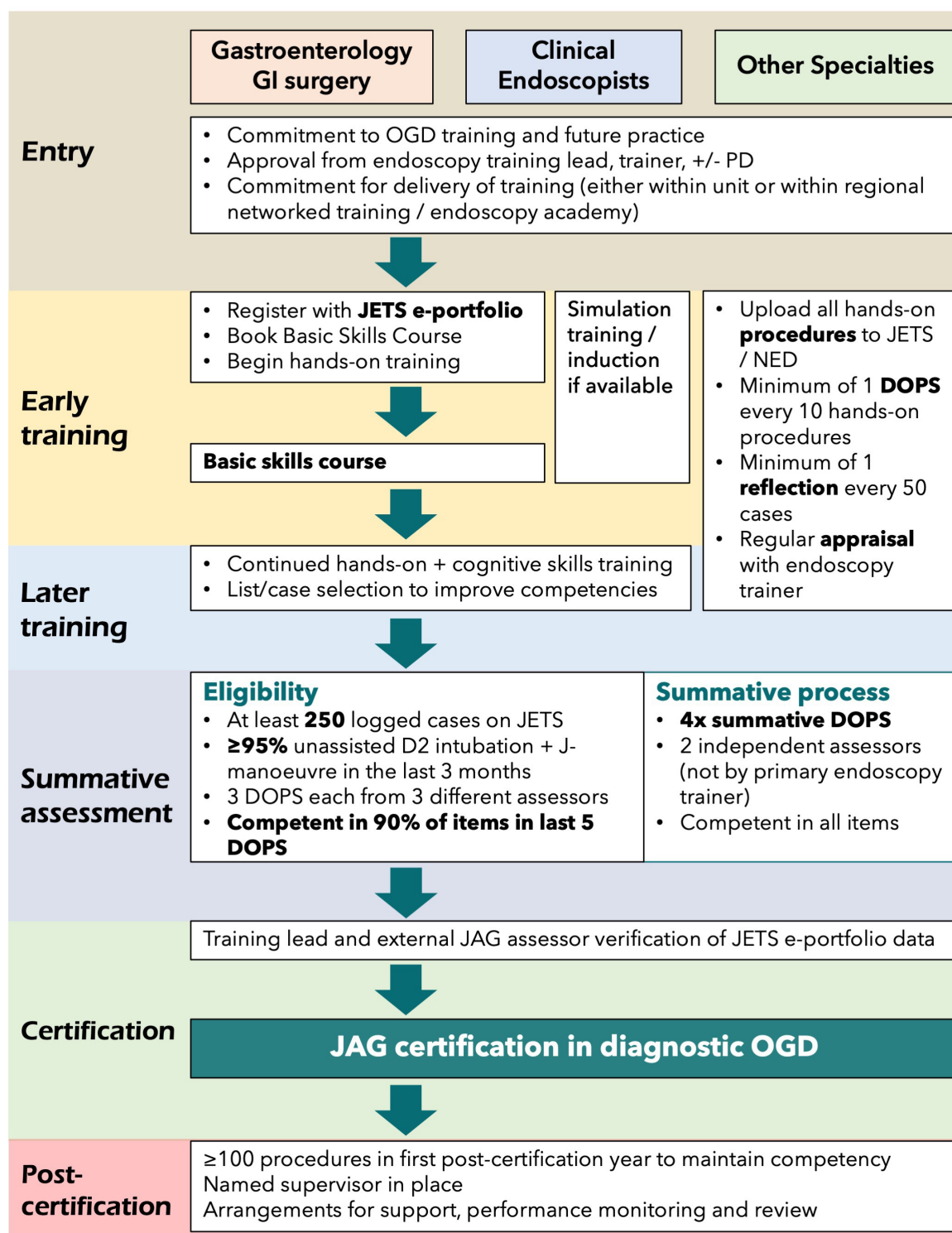


Figure 1 Proposed JAG pathway for training and certification in OGD. DOPS, direct observation of procedural skills; GI, gastrointestinal; NED, National Endoscopy Database; OGD, oesophagogastrroduodenoscopy; PD, program director

Guidelines

surveillance, and training in therapeutic modalities, for example, upper GI bleed haemostasis, oesophageal dilatation. This should include plans for supporting underperformance if self-reported or observed during the newly independent period, in line with JAG guidance.⁵⁵ Practitioners should also be encouraged to attend upper GI MDT meetings at least on an ad hoc basis.

4.3: Newly certified practitioners may perform OGD without direct supervision, but should have systems in place to ensure appropriate list size and caseload selection.

Evidence: **Very Low**; Recommendation: **Strong**; Agreement: **100%**

During newly-independent practice, it is possible that the cessation of directly supervised practice can lead to a drop in performance.⁵⁶ An analysis of completion metrics recorded on the UK trainee e-portfolio found a small but statistically significant decrement in mean D2 intubation and J-manoeuvre rates in the 3 months pre-certification versus post-certification.⁵ We suggest that, in the immediate post-certification period, there should be systems in place to ensure that list size and caseload selection is tailored to the practitioner. Existing JAG guidelines (predating COVID-19) recommend for a standard diagnostic OGD to be allocated a minimum of 20 min; this may need to be increased in the immediate post-certification period.

We recommend that complex cases, for example, acute upper GI bleeding, known therapeutic intent, previous intubation failure,⁵⁷ American Society of Anaesthesiologists grade 3+ or patients on the intensive care unit, should not be independently performed by the new-certified endoscopist unless deemed competent by a supervisor/training lead. Newly-certified practitioners should be able to review the caseload and volume on their list to ensure appropriateness, to anticipate issues and for time management purposes. This is a prerequisite for checklists and effective team briefing and should be considered part of the non-technical skills repertoire.^{58 59}

4.4: There should be appropriate mechanisms in place for performance monitoring and review during the early post-certification period.

Evidence: **Low**; Recommendation: **Strong**; Agreement: **100%**

The recent implementation of the UK NED enables key performance indicators in OGD to be collected centrally and benchmarked against national quality standards to quality assure endoscopy practice.¹² In accordance with JAG recommendations for quality assurance of services, performance data of newly-certified practitioners should be subjected to review at regular intervals to enable practitioners to discuss queries, concerns or issues with caseload or time management.

4.5: Significant adverse events should be discussed with the supervisor and reflected on in their appraisal.

Evidence: **Very Low**; Recommendation: **Strong**; Agreement: **100%**

Complications during OGD are rare but may be more common in interventional procedures performed by trainees.⁶⁰ All significant adverse events, that is, perforation, bleeding, missed cancer, postprocedural readmissions and mortality, should be discussed locally at an endoscopy governance meeting. In cases where adverse events are deemed to be avoidable through technical or non-technical factors attributable to the endoscopist, such cases should be formally reflected on and discussed in appraisals involving their supervisor.

4.6: In the post-certification period, newly-independent endoscopists should perform at least 100 procedures a year to maintain competence.

Evidence: **Very Low**; Recommendation: **Strong**; Agreement: **100%**

The BSG/AUGIS quality standards document suggests for each endoscopist to perform at least 100 OGDs per year to maintain proficiency and prevent skills decay.³ Evidence for this has been inferred from colonoscopy practice.³⁴ Although it is acknowledged that practitioners within training programmes may struggle to achieve such a volume due to conflicting commitments, endoscopy services and training programmes should strive to enable newly-independent practitioners to achieve such a volume in line with national guidance.

DISCUSSION

Adequate training in upper GI endoscopy is essential for procedural effectiveness, patient comfort and safety. Studies on PEUGIC from the UK and internationally have demonstrated a need to improve performance in diagnostic OGD. While there has been a structured training programme for competence in OGD in the UK for over a decade, we have been learning from this in order to improve the training experience for trainees and patients. This has been facilitated by the publication of BSG/AUGIS standards for OGD, and by evaluation of training methodologies and outcomes. Since the release of the first OGD certification document, training in OGD has evolved to include added focus on ENTS, lesion recognition, inspection technique, competency assessment and quality assurance of the training process itself.

Due to the limited available evidence, the nature of training studies and the rigours of GRADE, we acknowledge that much of the cited studies were of very-low to low quality evidence. The rationale for these recommendations lie within the relevant sections of this document. This revised curriculum has incorporated published evidence related to training, but has also provided expert consensus where evidence

is lacking but deemed to be important to the OGD training pathway. Future study and evaluation of the recommended measures will be required and will be facilitated by data from JETS and NED.

Although COVID-19 has had a profound effect on endoscopy training,⁶¹ the safety of trainees as well as patients remain paramount. Infection prevention measures will need to be adhered to in training situations, but the criteria set out in this curriculum document will remain unchanged.

Author affiliations

¹Department of Gastroenterology, Royal Cornwall Hospitals NHS Trust, Truro, UK

²Medical and Dental Sciences, University of Birmingham, Birmingham, UK

³Department of Gastroenterology, Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich, UK

⁴Department of Gastroenterology, St Mark's Hospital and Academic Institute, Harrow, UK

⁵Department of Gastroenterology, Royal Free London NHS Foundation Trust, London, UK

⁶Clinical Advisor, Health Education England, Leeds, UK

⁷Department of Gastroenterology, Division of Surgery and Interventional Science, University College London Hospital NHS Foundation Trust, London, UK

⁸Department of Gastroenterology, Coventry and Warwickshire NHS trust, University Hospitals Coventry and Warwickshire NHS Trust, Coventry, UK

⁹Endoscopy Department, University Hospital of North Durham, Durham, UK

¹⁰Department of Gastroenterology, Royal Wolverhampton Hospitals NHS Trust, Wolverhampton, UK

¹¹Joint Advisory Group on Gastrointestinal Endoscopy, Royal College of Physicians, London, UK

¹²Surgery and Cancer, Imperial College London, London, UK

¹³Department of Gastroenterology, Northern General Hospital, Sheffield, UK

¹⁴Department of Surgery, University Hospitals of Leicester NHS Trust, Leicester, UK

¹⁵Gastroenterology, Sandwell and West Birmingham Hospitals NHS Trust, Birmingham, UK

¹⁶President-Elect, British Society of Gastroenterology, London, UK

Twitter Keith Siau @drkeithsiau and Srivathsan Ravindran @Doc_Wot

Contributors Conception: KS, ILPB and AMV. DELPHI design: KS, ILPB and AMV. Literature searches: All authors. Electronic voting: All authors. Manuscript draft: All authors. Critical review and approval of final version: All authors.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study does not involve human participants.

Provenance and peer review Not commissioned; externally peer reviewed.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-

commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Keith Siau <http://orcid.org/0000-0002-1273-9561>

Durayd Alzoubaidi <http://orcid.org/0000-0001-8308-1667>

Srivathsan Ravindran <http://orcid.org/0000-0002-1162-9555>

REFERENCES

- Shenbagaraj L, Thomas-Gibson S, Stebbing J, *et al.* Endoscopy in 2017: a national survey of practice in the UK. *Frontline Gastroenterol* 2019;10:7–15.
- Menon S, Trudgill N. How commonly is upper gastrointestinal cancer missed at endoscopy? A meta-analysis. *Endosc Int Open* 2014;2:E46–50.
- Beg S, Ragunath K, Wyman A, *et al.* Quality Standards in upper gastrointestinal endoscopy: a position statement of the British Society of gastroenterology (BSG) and association of upper gastrointestinal surgeons of great britain and ireland (AUGIS). *Gut* 2017;66:1886–99.
- Siau K, Green JT, Hawkes ND, *et al.* Impact of the joint Advisory group on gastrointestinal endoscopy (JAG) on endoscopy services in the UK and beyond. *Frontline Gastroenterol* 2019;10:93–106.
- Siau K, Anderson JT, Valori R, *et al.* Certification of UK gastrointestinal endoscopists and variations between trainee specialties: results from the JETS e-portfolio. *Endosc Int Open* 2019;7:E551–60.
- Balshem H, Helfand M, Schünemann HJ, *et al.* GRADE guidelines: 3. Rating the quality of evidence. *J Clin Epidemiol* 2011;64:401–6.
- Menon S, Trudgill N. How commonly is upper gastrointestinal cancer missed at endoscopy? A meta-analysis. *Endosc Int Open* 2014;2:E46–50.
- Veitch AM, Uedo N, Yao K, *et al.* Optimizing early upper gastrointestinal cancer detection at endoscopy. *Nat Rev Gastroenterol Hepatol* 2015;12:660–7.
- Banks M, Graham D, Jansen M, *et al.* British Society of gastroenterology guidelines on the diagnosis and management of patients at risk of gastric adenocarcinoma. *Gut* 2019;68:1545–75.
- Valori R, Cortas G, de Lange T, *et al.* Performance measures for endoscopy services: a European Society of gastrointestinal endoscopy (ESGE) quality improvement initiative. *United European Gastroenterol J* 2019;7:21–44.
- Clough J, FitzPatrick M, Harvey P, *et al.* Shape of training review: an impact assessment for UK gastroenterology trainees. *Frontline Gastroenterol* 2019;10:356–63.
- Lee TJ, Siau K, Esmaily S, *et al.* Development of a national automated endoscopy database: the United Kingdom national endoscopy database (NED). *United European Gastroenterol J* 2019;7:798–806.
- Shirai Y, Yoshida T, Shiraishi R, *et al.* Prospective randomized study on the use of a computer-based endoscopic simulator for training in esophagogastroduodenoscopy. *J Gastroenterol Hepatol* 2008;23:1046–50.
- Qiao W, Bai Y, Lv R, *et al.* The effect of virtual endoscopy simulator training on novices: a systematic review. *PLoS One* 2014;9:e89224.
- Ende A, Zopf Y, Konturek P, *et al.* Strategies for training in diagnostic upper endoscopy: a prospective, randomized trial. *Gastrointest Endosc* 2012;75:254–60.
- Di Giulio E, Fregonese D, Casetti T, *et al.* Training with a computer-based simulator achieves basic manual skills required for upper endoscopy: a randomized controlled trial. *Gastrointest Endosc* 2004;60:196–200.

- 17 Ferlitsch A, Schoefl R, Puspoeck A, *et al.* Effect of virtual endoscopy simulator training on performance of upper gastrointestinal endoscopy in patients: a randomized controlled trial. *Endoscopy* 2010;42:1049–56.
- 18 Jirapinyo P, Kumar N, Thompson CC. Validation of an endoscopic part-task training box as a skill assessment tool. *Gastrointest Endosc* 2015;81:967–73.
- 19 Ekkelenkamp VE, Koch AD, de Man RA, *et al.* Training and competence assessment in GI endoscopy: a systematic review. *Gut* 2016;65:607–15.
- 20 Siau K, Hodson J, Neville P, *et al.* Impact of a simulation-based induction programme in gastroscopy on trainee outcomes and learning curves. *World J Gastrointest Endosc* 2020;12:98–110.
- 21 Khan R, Plahouras J, Johnston BC, *et al.* Virtual reality simulation training for health professions trainees in gastrointestinal endoscopy. *Cochrane Database Syst Rev* 2018;8:CD008237.
- 22 Mahmood T, Darzi A. The learning curve for a colonoscopy simulator in the absence of any feedback: no feedback, no learning. *Surg Endosc* 2004;18:1224–30.
- 23 Kruglikova I, Grantcharov TP, Drewes AM, *et al.* The impact of constructive feedback on training in gastrointestinal endoscopy using high-fidelity Virtual-Reality simulation: a randomised controlled trial. *Gut* 2010;59:181–5.
- 24 Anderson JT. Assessments and skills improvement for endoscopists. *Best Pract Res Clin Gastroenterol* 2016;30:453–71.
- 25 Khan R, Scaffidi MA, Satchwell J, *et al.* Impact of a simulation-based ergonomics training curriculum on work-related musculoskeletal injury risk in colonoscopy. *Gastrointest Endosc* 2020;92:1070–80.
- 26 Lee S-H, Park Y-K, Cho S-M, *et al.* Technical skills and training of upper gastrointestinal endoscopy for new beginners. *World J Gastroenterol* 2015;21:759–85.
- 27 Siau K, Hodson J, Anderson JT, *et al.* Impact of a national basic skills in colonoscopy course on trainee performance: an interrupted time series analysis. *World J Gastroenterol* 2020;26:3283–92.
- 28 Ooi J, Wilson P, Walker G, *et al.* Dedicated Barrett's surveillance sessions managed by trained endoscopists improve dysplasia detection rate. *Endoscopy* 2017;49:524–8.
- 29 van Vilsteren FGI, Pouw RE, Herrero LA, *et al.* Learning to perform endoscopic resection of esophageal neoplasia is associated with significant complications even within a structured training program. *Endoscopy* 2012;44:4–14.
- 30 Yao K, Uedo N, Muto M, *et al.* Development of an e-learning system for teaching endoscopists how to diagnose early gastric cancer: basic principles for improving early detection. *Gastric Cancer* 2017;20:28–38.
- 31 Bergman JJGHM, de Groof AJ, Pech O, *et al.* An interactive web-based educational tool improves detection and delineation of Barrett's Esophagus-Related neoplasia. *Gastroenterology* 2019;156:1299–308.
- 32 Miller AT, Sedlack RE, ACE Research Group. Competency in esophagogastroduodenoscopy: a validated tool for assessment and generalizable benchmarks for gastroenterology fellows. *Gastrointest Endosc* 2019;90:613–20.
- 33 Siau K, Crossley J, Dunckley P, *et al.* Direct observation of procedural skills (DOPS) assessment in diagnostic gastroscopy: nationwide evidence of validity and competency development during training. *Surg Endosc* 2020;34:105–14.
- 34 Jorgensen JE, Elta GH, Stalburg CM, *et al.* Do breaks in gastroenterology fellow endoscopy training result in a decrement in competency in colonoscopy? *Gastrointest Endosc* 2013;78:503–9.
- 35 Matharoo M, Haycock A, Sevdalis N, *et al.* Endoscopic non-technical skills team training: the next step in quality assurance of endoscopy training. *World J Gastroenterol* 2014;20:17507–15.
- 36 Walsh CM, Scaffidi MA, Khan R, *et al.* Non-technical skills curriculum incorporating simulation-based training improves performance in colonoscopy among novice endoscopists: randomized controlled trial. *Dig Endosc* 2020;32:940–8.
- 37 Vassiliou MC, Kaneva PA, Poulou BK, *et al.* Global assessment of gastrointestinal endoscopic skills (GAGES): a valid measurement tool for technical skills in flexible endoscopy. *Surg Endosc* 2010;24:1834–41.
- 38 Cass OW, Freeman ML, Peine CJ, *et al.* Objective evaluation of endoscopy skills during training. *Ann Intern Med* 1993;118:40–4.
- 39 Ward ST, Hancox A, Mohammed MA, *et al.* The learning curve to achieve satisfactory completion rates in upper GI endoscopy: an analysis of a national training database. *Gut* 2017;66:1022–33.
- 40 Walsh CM, Ling SC, Wang CS, *et al.* Concurrent versus terminal feedback: it may be better to wait. *Acad Med* 2009;84:S54–7.
- 41 Waschke KA, Anderson J, Valori RM, *et al.* ASGE principles of endoscopic training. *Gastrointest Endosc* 2019;90:27–34.
- 42 Ratcliffe E, Subramaniam S, Ngu WS. Endoscopy training in the UK pre-COVID-19 environment: a multidisciplinary survey of endoscopy training and the experience of reciprocal feedback. *Frontline Gastroenterol* 2021.
- 43 Wyles SM, Schwarz E, Dort J, *et al.* SAGE(S) advice: application of a standardized train the trainer model for faculty involved in a Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) hands-on course. *Surg Endosc* 2017;31:2017–22.
- 44 Academy of Medical Royal Colleges. The reflective practitioner: guidance for doctors and medical students, 2018. Available: https://www.aomrc.org.uk/wp-content/uploads/2018/09/the_reflective_practitioner_guidance_single_page.pdf
- 45 Dilly CK, Sewell JL. How to give feedback during endoscopy training. *Gastroenterology* 2017;153:632–6.
- 46 Ravindran S, Thomas-Gibson S, Murray S, *et al.* Improving safety and reducing error in endoscopy: simulation training in human factors. *Frontline Gastroenterol* 2019;10:160–6.
- 47 Macaulay CP, Winyard PJW. Reflection: tick box exercise or learning for all? *BMJ* 2012;345:e7468.
- 48 Siau K, Dunckley P, Valori R, *et al.* Changes in scoring of direct observation of procedural skills (DOPS) forms and the impact on competence assessment. *Endoscopy* 2018;50:770–8.
- 49 Teh JL, Tan JR, Lau LJF, *et al.* Longer examination time improves detection of gastric cancer during diagnostic upper gastrointestinal endoscopy. *Clin Gastroenterol Hepatol* 2015;13:480–7.
- 50 Bisschops R, Areia M, Coron E, *et al.* Performance measures for upper gastrointestinal endoscopy: a European Society of gastrointestinal endoscopy (ESGE) quality improvement initiative. *Endoscopy* 2016;48:843–64.
- 51 Sajid MS, Rehman S, Chedgy F, *et al.* Improving the mucosal visualization at gastroscopy: a systematic review and meta-analysis of randomized, controlled trials reporting the role of Simethicone ± N-acetylcysteine. *Transl Gastroenterol Hepatol* 2018;3:29.
- 52 Visrodia K, Singh S, Krishnamoorthi R, *et al.* Magnitude of missed esophageal adenocarcinoma after Barrett's esophagus diagnosis: a systematic review and meta-analysis. *Gastroenterology* 2016;150:599–607. quiz e14–5.
- 53 British Society of Gastroenterology ERCP Working Party. ERCP – the way forward, a standards framework, 2014. Available: <https://www.bsg.org.uk/asset/341DCD67-426A-44F4-910DD392C8A39606>
- 54 Siau K, Hodson J, Valori RM, *et al.* Performance indicators in colonoscopy after certification for independent practice: outcomes and predictors of competence. *Gastrointest Endosc* 2019;89:482–92.

- 55 Ravindran S, Thomas-Gibson S, Siau K. Joint Advisory group on gastrointestinal endoscopy (JAG) framework for managing underperformance in gastrointestinal endoscopy. *Frontline Gastroenterol* 2021.
- 56 Siau K, Hodson J, Valori RM, *et al*. Performance indicators in colonoscopy after certification for independent practice: outcomes and predictors of competence. *Gastrointest Endosc* 2019;89:482–92.
- 57 Siau K, Li J, Fisher NC, *et al*. Intubation failure during gastroscopy: incidence, predictors and follow-up findings. *J Gastrointest Liver Dis* 2017;26:339–44.
- 58 Matharoo M, Thomas-Gibson S, Haycock A, *et al*. Implementation of an endoscopy safety checklist. *Frontline Gastroenterol* 2014;5:260–5.
- 59 Ravindran S, Matharoo M, Coleman M, *et al*. Teamworking in endoscopy: a human factors toolkit for the COVID-19 era. *Endoscopy* 2020;52:879–83.
- 60 Fudman DI, Falchuk KR, Feuerstein JD. Complication rates of trainee- versus attending-performed upper gastrointestinal endoscopy. *Ann Gastroenterol* 2019;32:273–7.
- 61 Siau K, Iacucci M, Dunckley P, *et al*. The impact of COVID-19 on gastrointestinal endoscopy training in the United Kingdom. *Gastroenterology* 2020;159:1582–5.