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Changing perspectives in endoscopic ultrasonography training in Asia

Endoscopic ultrasonography (EUS) is an increasingly important sub-specialty practice for endoscopists in Asia. Formal training in EUS is traditionally provided as a one-year advanced endoscopy fellowship to experienced endoscopists. Considered technically daunting, the practice of EUS calls for a skillset that is beyond the scope of ordinary endoscopy. To become an endosonographer, an endoscopist must master the necessary technical, cognitive and interpretive skills. Acquiring the basic skills is just the beginning of a long journey in EUS education and practice. As technological advancements in EUS keep pushing the boundaries of its applications, endosonographers today must continue to learn and master new EUS techniques or procedures to remain professionally relevant.

This has significantly impacted EUS education/training, which now must cater for novices, as well as for practising endosonographers at varying levels of experiences. In Asia, where opportunities for formal EUS fellowship are extremely limited, this is a massive shortfall in training to fill up. To keep pace with the rapid developments in EUS practices, stakeholders must accelerate the delivery of EUS education/training.

To meet this challenge, the Asian EUS Group (AEG) has taken the lead in fast-tracking the dissemination of EUS knowledge and skills across Asia through its multinational network of training centres. AEG has conducted more than 100 short-term EUS courses in more than 16 Asian

cities since 2012, with remarkable success. Almost 1600 endosonographers have benefitted from the AEG programs, which are designed to cater to the needs of both basic and continuing EUS education. Programs typically combine lectures, live-case demonstrations, and hands-on training on phantoms, simulators or live animal models. Eligible candidates can enrol for the course that best suits their experience level, and can progress over as many courses as desired to attain their educational goals. AEG's programs are brought to wherever there is demand. Its versatile modular structure allows the programs to be easily customized and scaled up or down to suit local needs, making it highly adaptable to the changing and varying needs in different countries.

Fundamentals of EUS education and training

Endoscopic ultrasonography (EUS) is the minimally invasive imaging modality that enables the sonographic visualization of the walls of the gastrointestinal tract and adjacent structures in the mediastinum and pancreaticobiliary region. It enables the endoscopist to visualize anatomic details of the organs scanned, make diagnosis and initiate and monitor treatment [1].

Training endosonographers is a rigorous process since carrying out EUS requires a blend of technical, cognitive and interpretive skills. The technique necessitates a good

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background knowledge of ultrasonic imaging and familiarity with the cross-sectional anatomy of the gastrointestinal wall and nearby organs. Apart from acquiring the technical skills needed to safely manoeuvre the various types of echoendoscopes, the aspiring endosonographer must know the indications for EUS, expected outcomes, as well as risks involved. He/she must learn to recognize ultrasound patterns of organs in diseased and normal state, interpret whatever abnormalities are present, and be able to discriminate an imaging artefact from a real abnormality. By the end of basic EUS training, the trainee

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is expected to have acquired the essential skills to perform diagnostic EUS procedures, including EUS-guided fine needle aspiration (EUS-FNA) of biological fluids, as well as to be able to accurately diagnose/stage submucosal masses, and evaluate/manage common pancreatico-biliary disorders. Once a certain competency in performing these diagnostic EUS procedures is achieved, the trainee may advance to learn more complicated interventional procedures, e.g., drainage of pancreatic cysts, neurolysis of celiac plexus.

Conventional EUS training, credentialing, and shortage of training opportunities

Traditionally, the training of endosonographers in Asia has relied on both formal and informal training approaches. As in other regions, a formal advanced endoscopy fellowship with preceptorship by an expert EUS practitioner has always been perceived as the ideal way of training aspiring endosonographers. Such EUS fellowships are offered only to candidates with documented competence in diagnostic endoscopy and relevant aspects of therapeutic endoscopy. To-date, these fellowships remain the only formal and creditable form of EUS education in Asia. Delivered via lectures and hands-on tutelage, a typical EUS fellowship may run over a period of 12 months (in rare instances, 6 months), with clinical apprenticeship as the focal point of training. As training of EUS on human patients can involve significant risk of complications, fellows are given ample opportunities to hone their skills outside the endoscopy suite, using animal models or simulators. Clinical apprenticeships are particularly sought-after in Asia as such learning opportunities are extremely limited. A diverse range of diagnostic and therapeutic procedures is needed to accomplish the basic EUS training. For a new endosonographer to be credentialed, he/she must successfully complete a sizable number of luminal, pancreatobiliary EUS, and EUS-FNA procedures. There is no Asian consensus on the minimum level of training and experience to attain competency in EUS, but generally the internationally recognized guidelines for EUS credentialing are adopted, such

as those stipulated by the European Society of Gastrointestinal Endoscopy, British Society of Gastroenterology, or the American Society for Gastrointestinal Endoscopy (ASGE) [2-5].

Overall, the number of EUS fellowships in Asia has increased substantially in recent years, but the number of additional vacancies created is still insufficient to meet the rising demands. Scaling up of clinical apprenticeship is almost impossible as the number of trainees that a preceptor can take on each time is limited. Besides, there aren't many qualified mentors available to take on preceptorship responsibilities. There is thus a serious dearth of creditable EUS training opportunities for endoscopists in Asia. Some institutions in Asia now provide supplementary opportunities in the form of EUS observership programs that facilitate learning by observations of clinical procedures, but trainees on such programs are not allowed to actively carry out EUS.

Advancement in EUS practices and shift in training needs

EUS is a rapidly evolving subspecialty in gastroenterology. Continual advance-

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ments in EUS technologies is pushing the boundaries of EUS applications. What started off as a purely diagnostic imaging modality in the 1980s, EUS is now an indispensable imaging modality for diagnosis and preoperative staging of gastrointestinal and pancreatobiliary cancer, and a tool for a wide range of image-guided interventional therapeutic procedures, e.g. intratumoral drug delivery, celiac plexus neurolysis, brachytherapy, radiofrequency ablation of tumor, and drainage of pancreatobiliary fluid collections [6, 7, 8]. The need to train more endosonographers and upgrade skills of existing ones has become more pressing than ever before. This poses a strain on limited EUS

education resources which must now cater to the training of novices, as well as endosonographers at varying levels of their careers. The situation is especially critical now in Asia, where the shortage of formal EUS training fellowships persists.

New education models to accelerate EUS education and training

To accelerate the delivery of EUS education and training, more adaptive models of teaching that can be readily configured to meet specific local needs are necessary. In this respect, the Asian EUS Group (AEG), a non-profit professional interest group made up of regional EUS experts, has made the first move to fast-track the dissemination of EUS knowledge and skills across Asia. It does so by conducting regular intensive short-term EUS education programs through its network of training centres in countries across Asia. The programs, each comprising multiple modules/courses, are carefully designed to cater to the needs of both basic and continual EUS education in the region. Each course is tailored to a specific level of learning and aimed to accomplish specific learning outcomes. Programs typically combine the use of didactic lectures, hands-on learning using phantoms, simulators or live animal models, and skills demonstrations by expert practitioners through live video-streaming [9]. Where appropriate, newer innovative models of practical teaching are used to teach

interventional EUS, e.g. using the novel Mumbai 3-dimensional stereolithography bile duct prototype and artificial cysts filled with various materials for training of EUS-guided biliary and pseudocyst drainage, respectively [10]. A discussion forum after each hands-on session provides a platform for trainees to interact directly with experts and gain from the meaningful case discussions. Trainees have access to an expert international faculty throughout the duration of the course. AEG's courses are offered from basic to advanced levels, with advanced programs tailored to meet the continuing education needs of mid- to senior-level EUS practitioners interested to learn various EUS-guided

interventional procedures. Eligible candidates can enrol for the course that best suits their experience level, and advance over as many courses as desired to attain

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Advantages of AEG's short-term EUS training programs

AEG's open-ended model of learning provides an alternative pathway to gain EUS knowledge or skills where formal training opportunities are lacking or not suitable. Although not as rigorous as full-time EUS fellowships, these short-term intensive and interactive programs are useful, effective, and a certain boost to existing efforts. A study conducted by Wang *et al* (2015) has shown that the well-structured EUS training programs organized by AEG improved EUS skills significantly [11]. Post-training, the trainees recorded significant improvement in the overall mean (\pm SD) scores in tests conducted ($77.5 \pm 0.2\%$ vs. $66.0 \pm 0.3\%$ pre-training, $P < 0.0001$). The short term training programs are not meant to replace established EUS fellowships; rather they complement existing education/training efforts, and help expedite the dissemination of EUS knowledge and skills at an Asia-wide level. Compared to one long fixed-term fellowship, breaking the course of training to shorter progressive modules can in fact be advantageous to some. Modular learning makes it expedient for learners to learn at their own pace, and is particularly appropriate for continual EUS education of busy endosonographers who need the flexibility of progressive learning to avoid long down-time and disruption to their regular practices.

Propagating EUS education – the training of trainers

Since 2012, AEG has conducted more than 100 EUS training programs in

Northeast Asia (mainland China, Hong Kong SAR, Japan, Korea, Taiwan), Southeast Asia (Vietnam, Thailand, Myanmar, Philippines, Malaysia, Singapore, Indonesia), South Asia (Sri Lanka, India, Pakistan), and West Asia (Saudi Arabia), with remarkable success [11]. Thus far, the number of endosonographers trained through AEG programs has reached nearly 1600 (personal communication, Ho K Y). With this early success, the AEG has gone beyond the training of endosonographers to train a group of professional EUS trainers who could be assigned to train others in the region. The AEG “train-the-trainer” program is uniquely suitable for Asian requirements, and is only offered to senior endosonographers who are sufficiently experienced and willing to take on EUS teaching and mentoring responsibilities at their own places of practice. Prospective trainers must undergo a brief AEG trainer course, become familiar with the AEG model of EUS education, and achieve a certain competency before they are authorised to train endoscopists in their own localities. To-date, AEG's “train the-trainer” programs have produced almost 50 trainers in countries across Asia. These qualified trainers are now doing their part to fill the gaps of EUS education/training in their home countries, using the same AEG training model.

Prospects of further development

AEG's EUS programs are still in the early stage of development: there is plenty of room for improvement. For example, the curriculum for various modules could be further strengthened by better streamlining content to enhance learning outcomes. As the programs do not provide clinical tutelage, arrangements must be made with various centres of excellence for EUS training to allow graduates from the AEG programs who have acquired sufficient credits to undergo a variable-term apprenticeship under a senior EUS practitioner to gain hands-on experience and to achieve proper credentials for the practice of EUS. To this end, it may be necessary to work with regional academic tertiary centres to devise a common robust system for proper assessment of the competency of graduates from alternative learning pathways, and open the way for qualified graduates to gain

further hands-on experiences to enter mainstream EUS practices.

Conclusions

The education and training of endosonographers will remain a formidable challenge in most parts of Asia for years to come. A shift in mind-set on how endosonographers should be trained to accommodate a diverse range of training programs should help Asia cope with the current dearth of formal EUS training fellowships. AEG's open-ended progressive learning model is expected to adapt well to the changing needs and help expedite the training of endosonographers in Asia. But the value of these training programs can only be fully realized if these programs can be officially endorsed and graduates can move on to formal clinical apprenticeship to achieve the credentials required for EUS practice.

References

1. Shami VM, Waxman I. Technology Insight: current status of endoscopic ultrasonography. *Nat Clin Pract Gastroenterol Hepatol* 2005;2:38-45.
2. Wani S, Cote GA, Keswani R, et al. Learning curves for EUS by using cumulative sum analysis: implications for American Society for Gastrointestinal Endoscopy recommendations for training. *Gastrointest Endosc* 2013;77:558-65.
3. Eisen GM, Dominitz JA, Faigel DO, et al. Guidelines for credentialing and granting privileges for endoscopic ultrasound. *Gastrointest Endosc* 2001;54:811-4.
4. Polkowski M, Larghi A, Weynand B, et al. Learning, techniques, and complications of endoscopic ultrasound (EUS)-guided sampling in gastroenterology: European Society of Gastrointestinal Endoscopy (ESGE) Technical Guideline. *Endoscopy* 2012;44:190-206.
5. Meenan J, Harris K, Oppong K, et al. Service provision and training for endoscopic ultrasound in the UK. *Frontline Gastroenterology* 2011;2:188-94.
6. Nishimura M, Togawa O, Matsukawa M, et al. Possibilities of interventional endoscopic ultrasound. *World J Gastrointest Endosc* 2012;4:301-5.
7. Fusaroli P, Ceroni L, Caletti G. Forward-view Endoscopic Ultrasound: A Systematic Review of Diagnostic and Therapeutic Applications. *Endosc Ultrasound* 2013;2:64-70.
8. Arshad HM, Bharmal S, Duman DG, Liangpunsakul S, Turner BG. Advanced endoscopic ultrasound management techniques for preneoplastic pancreatic cystic lesions. *J Investig Med* 2016.
9. Ho KY. Endoscopic ultrasonography education in Asia: are we there yet? *Digestive Endoscopy* 2004;16:S144-S7.
10. Dhir V, Itoi T, Fockens P, et al. Novel ex vivo model for hands-on teaching of and training in EUS-guided biliary drainage: creation of “Mumbai EUS” stereolithography/3D printing bile duct prototype (with videos). *Gastrointest Endosc* 2015;81:440-6.
11. Wang MH, Dy F, Vu VK, et al. Structured endoscopic ultrasonography (EUS) training program improved knowledge and skills of trainees: Results from the Asian EUS Group. *Dig Endosc* 2015;27:687-91.