EFSUMB
EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY
'Building a European Ultrasound Community'

MINIMUM TRAINING REQUIREMENTS FOR THE PRACTICE OF MEDICAL ULTRASOUND IN EUROPE

Appendix 9: Endoscopic Ultrasound in Gastroenterology

This curriculum is intended for clinicians who perform endoscopic ultrasonography (EUS) in gastroenterology. It includes standards for theoretical knowledge and practical skills. It is mandatory to be experienced in GI endoscopy, and Level 1 competence should be obtained by anyone performing EUS unsupervised.

Level 1

- It is recommended that the trainee perform 1-3 examinations under supervision per week and that a total of at least 100 examinations are undertaken.EUS may be performed with different EUS-systems, and ideally training should include the use of transendoscopic miniprobes and linear and/or radial echoendoscopes. Continuous individual assessment of the trainee's competence and skills is important.
  - Examinations should include the full range of pathological conditions listed below
  - A log book listing the types of examinations undertaken should be kept
  - Training should be supervised by a level 2 practitioner
  - Trainees should attend EUS courses and read appropriate literature
  - It is recommended that a medical practitioner performing level 1 EUS should continue to perform at least 30-50 EUS examinations each year and attend EUS meetings.
  - The competence assessment sheet will determine in which area the trainee can practice independently

Knowledge base

Physics and Technology, EUS Techniques and Administration

- EUS requires that the operator combines the knowledge and experience of GI endoscopy and ultrasonography (US). Although the principles of imaging are the same as with transabdominal US it is also mandatory to train specifically in interpreting the images acquired with intraluminal, high-frequency US transducers. Compared to transabdominal US, EUS is even more dependent on continuous site orientation and image interpretation during the examination.

- The EUS operator needs to be trained in all aspects of GI endoscopy.
  For required level 1 skills in general ultrasonography, see Appendix 2.

Sectional EUS anatomy

- General GI wall structure
- Oesophagus

- Mediastinum (Lymph nodes, trachea and bronchi, aorta, heart, pleura)
- Stomach
- Duodenum
- Liver
- Pancreas
- Gallbladder
- Biliary system
- Portal venous system and spleen
- Kidneys and Adrenal glands
- Other structures (vessels and lymph nodes)
- Anus and Rectum
- Colon

Pathology in relation to EUS

- The GI wall: Thickness and number of wall layers, subepithelial and intramural benign and malignant tumours with relation to wall layers, normal and abnormal vascular structures
- Oesophagus: Wall layers, cardia, achalasia, oesophageal tumours, varices
- Mediastinum: abnormal lymph nodes, tumours, cysts, aneurysms, pleural fluid
- Stomach: abnormal wall layers, tumours, cysts, ulcers, vascular disorders, lymphomas, linitis plastica
- Duodenum: Tumours, ulcers
- Liver: Benign and malignant tumours, cysts, dilated bile ducts, vascular structures
- Pancreas: Tumours, pancreatitis, calcification, cysts, duct changes
- Gallbladder and biliary system: Stones, tumours , inflammation, level and cause of obstruction
- Portal venous system and spleen: portal hypertension, thrombosis, splenomegaly
- Kidneys and Adrenal glands: Tumours, hydronephrosis
- Anus and Rectum: Tumours, inflammatory bowel disease, fistulas, defecation disorders
- Colon: Tumours, inflammatory bowel disease, lymphomas
- Other structures: abnormal lymph nodes and masses, aneurysms, thromboses, ascites

Competence to be acquired

The GI wall

To be able to:

- Recognise the normal and abnormal GI wall and wall layers
- Recognise intramural tumours and their structure with relation to wall layers and extension into the surrounding tissues.
- Evaluate the size of ulcers

Oesophagus

To be able to:

- Perform a thorough EUS examination of the wall of the oesophagus at different levels
- Recognise normal anatomy and variants
- Recognise abnormal wall and wall layers
- Recognise tumours (cancer, leiomyomas, gastrointestinal stromal tumour (GIST),with origin, structure and extension
- Recognise abnormal vessels

Mediastinum

To be able to:

- Recognise normal mediastinal structures and organs (heart, aorta, pleura, azygos vein, pulmonary vessels, trachea and bronchi, lymph nodes
- Evaluate abnormal structures, oesophageal cancer TN–staging, other tumours, enlarged lymph nodes, aneurysms, varices

Stomach and Duodenum

To be able to:

• Recognise the normal and abnormal gastric and duodenal wall
• Evaluate tumours, TN-staging of gastric cancer, leiomyomas, GIST,
• Recognise intra- and perimural extent and structure of ulcers
• Recognise lymphomas, linitis plastica, varices

Liver

To be able to:

- Recognise normal and abnormal liver texture
- Recognise focal lesions
- Recognise normal and abnormal hepatic and portal venous anatomy

Pancreas

To be able to:

- Perform a thorough examination of the pancreas
- Recognise solid and cystic tumours
- Perform staging of cancer
- Recognise structural changes seen in pancreatitis
- Recognise pancreatic duct dilatation and pancreatic duct stones

Gallbladder and biliary system

To be able to:

- Perform a thorough evaluation of the gallbladder and biliary system
- Recognise normal ultrasonic anatomy of the gallbladder and biliary system and its frequent normal variants
- Recognise abnormalities of the gallbladder wall and lumen (stones, sludge, tumours)
- Be able to assess bile duct dilatation at intra hepatic and extra hepatic levels
- Detect small bile duct stones and tumours
- Detect and stage tumours of the papilla of Vater
- Distinguish between a dilated common bile duct and the portal vein

Portal venous system and spleen

To be able to**:**

- Evaluate the spleen and recognise focal lesions
- Evaluate the portal vein and its diameter, the confluence between the splenic vein,
- superior mesenteric vein and the portal vein and follow the splenic vein into the hilum of the spleen.
- Evaluate thrombosis and possible tumour ingrowth into these veins

Kidneys and Adrenal glands

To be able to:

- Recognise tumours and cysts in the kidneys, hydronephrosis, structural changes
- Recognise the left adrenal gland and detect lesions eg tumours within it

Anus and rectum

To be able to:

- Evaluate benign and malignant tumours and inflammatory bowel disease
- Perform staging of malignant tumours
- Recognise fistulas and abscesses
- Recognise perirectal organs (uterus, vagina, urinary bladder)

Colon

To be able to:

- Evaluate benign and malignant tumours and inflammatory bowel disease
- Perform staging of malignant tumours
- Recognise pericolic organs (small bowel, major vessels, gallbladder, liver)

Other structures

To be able to:

- Recognise abnormal lymph nodes and masses
- Recognise aneurysms and thromboses
- Recognise ascites and fluid collections
- Identify the coeliac axis
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Level 2

Knowledge base

- Competencies will have been gained during training for level 1 practice and then refined during a period of practice, which will involve at least one year of experience with a minimum of two EUS examination per week.
- A further 300 examinations should have been undertaken in order to encompass the full range of conditions and procedures as listed below.
- Supervision and training should be undertaken by someone who has achieved level 2 competence in EUS and has had at least 2 years experience at that level.
- The trainee should be competent to accept referrals from level 1 practitioners.
- The trainee should be able to perform EUS-guided interventions (biopsies from tumours and lymph nodes, plexus neurolysis, cystogastric drainage). Supervision and training for these procedures should be undertaken by someone who has achieved level 3 competence in EUS and has had at least 2 years experience at that level.
- The trainee should be able to perform intraductal ultrasonography (IDUS).

EUS anatomy

Detailed understanding of gastrointestinal, mediastinal, peritoneal, omental, vascular and retroperitoneal anatomy is required

Pathology in relation to EUS

- An understanding of disease processes which affect the mediastinum, peritoneal cavity, its mesenteries, ligaments and compartments.
- An understanding of the pathways of spread of mediastinal, intraperitoneal and retroperitoneal disease.
- An understanding of the role of ultrasound contrast agents in differentiating between benign and malignant lesions.
- An understanding of the role of sonoelastography
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Competence to be acquired

To be able to:

- Perform a comprehensive EUS examination of the GI-wall, mediastinum and abdominal organs that can be imaged by EUS-systems (radial- and linear echoendoscopes and miniprobes).
- Identify GI tumours
- Perform staging of oesophageal, gastric, rectal and colonic cancer
- Differentiate between solid tumours, cysts and vascular structures
- Recognise dilated biliary and pancreatic ducts and identify the cause and level of obstruction
- Recognise small biliary and pancreatic stones in non-dilated ducts
- Recognise and localise small endocrine tumours in the pancreas
- Recognise parenchymal and duct changes in patients with pancreatitis
- Recognise and evaluate subepithelial and intramural tumours with respect to layer of origin
- Perform spectral, colour and power Doppler EUS
- Recognise vascular disorders, aneurysms, thromboses, varices and vascular malformations
- Evaluate the layers of the GI wall and identify changes in the wall and individual layers to diagnose lymphomas, linitis plastica, inflammatory bowel disease
- Evaluate the intra- and extramural extent of ulcers
- Perform EUS guided intervention, fine-needle and tru-cut biopsies, neurolysis, cyst drainage
- Perform IDUS which requires endoscopic experience at ERCP level

Level 3

A level 3 practitioner is likely to spend the majority of time undertaking gastrointestinal endoscopy, diagnostic and therapeutic GI endosonography, teaching, research and development and will be an ”expert” in this area.

Frequently transabdominal US will also be undertaken

Maintenance of skills

Having been assessed as competent to practice there will be a need for continued professional medical education and maintenance of practical skills.

Practitioners should:

- include EUS in their ongoing continued medical education
- audit their practice
- participate in multidisciplinary meetings
- keep up to date with relevant literature

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APPENDIX 9: GASTROENTEROLOGICAL ENDOSONOGRAPHIC TRAINING COMPETENCY ASSESSMENT SHEET

Trainee _____ Trainer _____

Core Knowledge Base – Level 1

	Trainer Signature	Date		Trainer Signature	Date
Physics and technology			Sectional EUS anatomy		
EUS Techniques			Pathology in relation to EUS		
Administration					

Competencies/Skills to be acquired Level 1

To be competent to perform/diagnose etc the following:

	Trainer Signature	Date		Trainer Signature	Date
Oesophagus			**Pancreas**		
• EUS examination of oesophagus			• EUS examination of pancreas		
• Normal oesophageal anatomy & variants			• Normal pancreatic anatomy & variants		
• Abnormal wall layers			• Pancreatic tumours and staging		
• Tumours			• Pancreatitis		
• Abnormal vessels			• Pancreatic duct dilatatrion & stones		
Mediastinum			**Gallbladder & Biliary System**		
• Normal mediastinal structures & variants			• EUS examination of gallbladder & biliary system		
• Oesophageal cancer staging (TN)			• Normal anatomy & variants		
• Enlarged lymph nodes			• Abnormalities of gall bladder wall & lumen		
• Aneurysms			• Bile duct dilatation		
• Varices			• Bile duct stones & tumours		
Stomach and Duodenum			• Tumours of papilla of Vater		
• EUS examination of stomach & duodenum			• Distinguish between common bile duct & portal vein		
• Normal anatomy & variants			**Portal venous system & spleen**		
• Normal and abnormal wall layers			• EUS examination of spleen & portal venous system		
• Cancer Staging (TNM)			• Normal anatomy & variants		
• Other tumours			• Focal splenic lesions		
• Ulcers			• Thrombosis & tumour ingrowth into portal venous system		
• Varices			**Kidneys & Left Adrenal Gland**		
Liver			• EUS examination of kidneys and left adrenal gland		
• Normal anatomy & variants			• Normal anatomy & variants		
• Normal & abnormal texture			•Tumours & Hydronephrosis of kidneys		
• Focal lesions			•Tumours within left adrenal gland		
• Normal & abnormal vasculature					

APPENDIX 9: GASTROENTEROLOGICAL ENDOSONOGRAPHIC TRAINING COMPETENCY ASSESSMENT SHEET

Trainee _____ Trainer _____

	Trainer Signature	Date
Anus & Rectum		
• EUS examination of anus & rectum		
• Normal anatomy & variants		
• Tumours		
• Inflammatory bowel disease		
• Fistulas & abscesses		
• Cancer staging (TNM) with rectal probes		
• Perirectal organs		
Colon		
• EUS examination of colon		
• Normal anatomy & variants		
• Tumours		
• Inflammatory bowel disease		
• Staging of malignant tumours		
• Pericolic organs		
Other structures		
• Abnormal lymph nodes & other masses		
• Aneurysms & thromboses		
• Ascites & other fluid collections		
• Coeliac axis		

APPENDIX 9: GASTROENTEROLOGICAL ENDOSONOGRAPHIC TRAINING COMPETENCY ASSESSMENT SHEET

Trainee _____ Trainer _____

Competencies/Skills to be acquired at Level 2
To be competent to perform/diagnose etc the following:

As for Level 1 plus:

	Trainer Signature	Date
• EUS examination using radial & linear		
• Small endocrine tumours in the pancreas		
• Perform spectral, colour and power Doppler		
• Intra & extramural extent of ulcers		
• Intraductal ultrasound		
Interventional EUS		
• Fine needle aspiration biopsy		
• Tru-cut biopsy		
• Neurolysis		
• Cyst drainage		