Title:
Basic training in digestive endoscopy for resident physicians in gastroenterology. Recommendations by the Sociedad Española de Endoscopia Digestiva (SEED)

Authors:
Álvaro Brotons, Angels Vilella, Cristina Sánchez-Montes, Catalina Garau, Albert Vila, Vicente Pons Beltrán, Carlos Dolz Abadía

DOI: 10.17235/reed.2018.5545/2018
Link: PubMed (Epub ahead of print)

Please cite this article as:

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
Basic training in digestive endoscopy for resident physicians in gastroenterology. Recommendations by the Sociedad Española de Endoscopia Digestiva (SEED)

Álvaro Brotons¹, Angels Vilella¹, Cristina Sánchez-Montes², Catalina Garau¹, Albert Vila³, Vicente Pons-Beltrán² and Carlos Dolz Abadía¹

¹Service of Digestive Diseases. Hospital Universitario Son Llàtzer. Palma de Mallorca, Spain. ²Service of Digestive Diseases. Hospital Universitario La Fe. Valencia, Spain. ³Fujifilm España

Received: 20/2/2018
Accepted: 5/03/2018
Correspondence: Angels Vilella. Service of Digestive Diseases. Hospital Universitario Son Llàtzer. Ctra. Manacor, km 4. 07198 Palma, Illes Balears. Spain
e-mail: angels.vilella@gmail.com

ABSTRACT
Digestive endoscopy is the most effective tool available for the diagnosis of multiple gastrointestinal (GI) tract conditions, and it represents a key aspect in the training of gastroenterology residents according to the Spanish MIR (médico interno residente) program.
The Sociedad Española de Endoscopia Digestiva (SEED), aware of all the technical advances that have emerged during the past few years, deems it necessary to define a program of the skills specialists-in-training in gastroenterology should acquire during their residency. This paper describes the goals of endoscopy training, the techniques that should be mastered, and the diagnostic and therapeutic skills this specialty requires. Finally, a model is suggested for the assessment of competence.

Key words: Endoscopy. Teaching. Training. Competence.

INTRODUCTION
Digestive endoscopy is the most effective tool available for the diagnosis and treatment of many gastrointestinal (GI) tract conditions. It represents a highly significant aspect in the MIR program curriculum for gastroenterologists-in-training, which should be updated, harmonized, and structured so that future specialists may get the most from the time invested in specific endoscopic training.

The Sociedad Española de Endoscopia Digestiva (SEED), aware of all the technical advances that emerged during the last few years, deems it necessary to define a competence program for gastroenterologists-in-training during their residency period. Such training program in digestive endoscopy should include detailed learning objectives and skills to be acquired, and suggest a learning period based on the specialty training program currently in force. This learning period should be organized, supervised, evaluated, and accredited by teaching units in compliance with the provisions of the Royal Decree 183/2008 (1).

Digestive endoscopy training may be structured according to two distinct classifications (Table 1). First, based on its purpose; second, based on the digestive system organs involved, that is, according to topography.

Using a topographic classification, and according to the current training program (Order SAS/2854/2009) (2), basic, necessary skills for a MIR trainee in gastroenterology include esophagogastrroduodenoscopy (EGD) and colonoscopy, including their related basic therapeutic procedures. Endoscopic retrograde cholangiopancreatography (ERCP), endoscopic ultrasound (EUS), enteroscopy, and most likely also capsule endoscopy, which fall in the highly complex endoscopy procedures class, would remain outside the MIR program, and be categorized as skills to be developed post-MIR as a “specific competence area” (área de competencia específica [ACE]) of advanced endoscopy, currently under development (3-5).

Furthermore, there should be a rational learning sequence starting by understanding normal endoscopic anatomy and its variants, and progressing to the diagnosis of common and then increasingly complex conditions. Such sequence should not be overlooked as it would disrupt learning and result in knowledge gaps that ultimately impair the sum total of endoscopic competence.

Competence is defined as an integrated whole encompassing the knowledge (what should be known), skills (what should be known how to do) and attitudes (how to act and how to
be) a professional should acquire.

Competence to perform an endoscopic procedure should be based on appropriate technical expertise as objectively assessed. This must be documented by the training and clinical staff, as well as the head of department.

The extent to which a resident has acquired skills in order to perform a specific procedure may be classified into three levels:

- **Level 1:** activities performed by the resident physician without direct supervision. The resident does and then reports.
- **Level 2:** activities performed by the resident physician under the supervision of a tutor/attending physician. The resident has extensive knowledge but not enough experience to perform a specific procedure or treatment independently.
- **Level 3:** activities performed by senior physicians with the help of a resident physician.

These levels are associated with endoscopic techniques based on the complexity of the endoscopic procedures involved.

**MIR training in gastroenterology** must be tutored by an experienced specialist, including intensive supervision during initial phases. Resident physicians will progressively perform increasingly complex procedures under supervision.

A goal of the present paper is to determine the theoretical aspects included in quality training and adequate competence assessment on training completion. A competent MIR trainee should be able to: perform diagnostic procedures efficiently and safely; understand indications and contraindications; guide sedation for endoscopic procedures; provide a description of endoscopic findings allowing to establish follow-up recommendations and needs; identify patient-specific risks in order to minimize complications and adverse effects; deliver basic endoscopic therapies, leaving complex procedures for a later stage. Should complications arise, he/she should be able to outline a resolution plan. Finally, a MIR trainee should be knowledgeable of cleaning and disinfection protocols in coordination with the endoscopy nursing staff.

**Digestive endoscopy training in the European Union**
The European Board of Gastroenterology and Hepatology (EBGH) is an European agency set up by the European Union of Medical Specialists (UEMS: Union Européenne des Médecins Spécialistes). The EBGH has developed and published a Blue Book (6) on gastroenterology and hepatology training.

This book sets standards for the training and education of future specialists in gastroenterology. Recommendations include the desirable contents of training programs in digestive endoscopy, the competences that should be acquired, and assessment approaches using objective, documented criteria. The EBGH encourages European countries to either use their national training programs taking the EBGH-designed curriculum as much as possible into account, or to directly endorse their Blue Book as a guide to specialty training. The SEED has considered these guidelines for the Spanish MIR training program in gastroenterology. Nevertheless, they have also considered the recommendations on digestive endoscopy training issued by the American Society for Gastrointestinal Endoscopy (ASGE) (7,8) and other societies (9,10).

**Objectives of the basic training program in digestive endoscopy for gastroenterologists**

Training in digestive endoscopy should not be envisaged as an acquisition of technical skills in the handling of endoscopes for diagnostic or therapeutic purposes but also as a learning of both theoretical and clinical concepts that provide interpretative content to technical competence. The goals of a training program would include:

- Acquiring adequate skills for the performance of digestive endoscopy procedures during the course of the MIR training program in gastroenterology in Spain.
- Establishing program contents.
- Establishing the schedule and sequence of theoretical knowledge and practical skills MIR physicians must develop.
- Establishing the basic diagnostic endoscopic techniques MIR physicians must master.
- Telling basic therapeutic endoscopic techniques from advanced ones.
- Establishing the theoretical contents and structure needed to develop competence in sedation guiding during endoscopy (11).
- Discussing the mechanical, optical, and electronic structure of endoscopy devices.
Discussing cleansing, disinfection, and sterility concepts for endoscopy equipment and ancillary items.

− Learning the terminology and vocabulary that should be used for digestive endoscopy, and how to use it in endoscopy reports.

− Knowledge of software programs for the edition of endoscopic images and video footage.

− Knowledge of decision elements to appropriately manage requests for digestive endoscopy procedures.

− Instilling in trainees the relevance of reviewing patient medical records before endoscopy; considering the medical and surgical history; reviewing allergies, medications, prior endoscopy reports, pathology reports, sedation issues; considering potential contraindications for the endoscopic technique or therapeutic procedures that might ensue.

− Introducing multidisciplinary work including gastroenterologists, surgeons, radiologists, oncologists, and anesthetists as the desirable modus operandi. Encouraging the use of grand rounds and interdisciplinary committees as work tools.

− Encouraging cooperation and friendly manners as an added value for teamwork.

− Providing understanding of legal standards applicable to patient information, data confidentiality, image rights, and compliance with data protection provisions.

− Training in digestive endoscopy should last a minimum of 12 months. Table 2 lists the minimum number of procedures recommended during basic training in digestive endoscopy.

Once the basic training program in digestive endoscopy has been completed, a digestive system specialist may supplement his or her training, outside the MIR program, by acquiring knowledge and skills in advanced endoscopy in accredited units. Such training should also last a minimum of one year, possibly extending to two years.

Please visit the members section at the SEED web page (http://www.wseed.org) for additional details on the contents of these recommendations for basic training in digestive endoscopy for gastroenterologists.

BASIC ENDOSCOPIC TECHNIQUES
Esophagogastroduodenoscopy (EGD)

**Theoretical knowledge required to achieve competence in diagnostic EGD**

1. Understanding the anatomy of the hypopharynx in order to interpret esophageal intubation under direct endoscopic visualization.
2. Understanding the anatomy of the upper and lower esophageal sphincter, stomach, pylorus, and duodenum. Understanding the anatomical structures adjacent to the upper GI tract. Understanding the histology and components of the upper GI tract wall.
3. Understanding a gastroscope’s structure, including its mechanical, electronic, lighting, and optical components.
4. Understanding indications, contraindications and required preparation.
5. Understanding complications and their appropriate management.
6. Understanding normal endoscopic findings and normal variants.
7. Understanding malformations and embryonic development abnormalities in the upper GI tract.
8. Understanding the postsurgical anatomy of the upper GI tract.
9. Understanding diagnostic alternatives to EGD.
10. Understanding the implications of a partially obstructed airway by a gastroscope in a patient undergoing endoscopic sedation.
12. Indications of antibiotic prophylaxis.
13. Understanding risk for cardiovascular complications in patients receiving antiaggregant or antithrombotic agents (12,13).
14. Knowing how to write reports using standardized endoscopy-related terminology and nomenclature.
15. Understanding informed consent for EGD and associated therapeutic procedures.
16. Communicating endoscopic findings to patients and their relatives, and providing recommendations for future care.
17. Understanding major esophageal diseases:
   b. Infectious esophagitis.
   c. Esophageal varices.
d. Eosinophilic esophagitis.
e. Esophageal diverticula. Zenker’s diverticulum.
f. Barrett’s esophagus.
g. Subepithelial lesions or tumors.
h. Benign neoplasms.
i. Malignant neoplasms.
k. Esophageal motility disorders.

18. Understanding major gastric diseases:
   a. Acute and chronic epithelial inflammatory lesions.
b. Erosions and benign ulcers.
c. Gastric mucosal atrophy.
d. Infection with \textit{Helicobacter pylori}.
e. Portal hypertensive gastropathy.
f. Gastric surgery. Types. Gastroenteroanastomosis.
g. Subepithelial lesions and tumors.
h. Malignancies. Classification and histologic types.
i. Benign neoplasms.
j. Gastric polyps. Classification.
k. Vascular malformations.
l. Submucosal lesions and thickened gastric folds.
m. Gastric ulcer.
n. Graft-versus-host disease (GvHD).

19. Understanding major duodenal diseases:
   a. Gastric heterotopia and Brunner’s gland hyperplasia.
b. Erosions and duodenal ulcers.
d. Whipple’s disease.
e. Duodenal varices.
f. Benign and malignant tumors.
g. Vascular malformations, lymphangiectasia.
h. Cystic dystrophy of the duodenal wall.
i. Benign and malignant lesions of the duodenal papilla (complete visualization with duodenoscope).
j. Duodenal diverticulum.

20. Understanding percutaneous endoscopic gastrostomy (PEG):
a. Indications, contraindications, and therapeutic alternatives.
b. Methodology and materials used, including gastrostomy tube types. Push and pull methods (14,15).
c. Complications and their management.

21. Understanding foreign bodies:
a. Complications foreign bodies may cause.
b. Adapting removal to foreign body type, shape, composition and size (16).
c. Tools and methods for removal.
d. Theoretical grounds for overtube usage.
e. Therapeutic alternatives

22. Understanding stricture dilation:
a. Indications, contraindications, and therapeutic alternatives (17).
b. Dilator types and dilation methods.
c. Risk factors for complications.
d. Sequential progression in dilation sessions.
e. Complications and how to treat them.

23. Understanding stents:
a. Indications, contraindications, and therapeutic alternatives.
b. Placement techniques and stent types and composition.
c. Complications and how to approach them.

Understanding the accessories used for diagnostic and therapeutic EGD

This section lists the various tools and materials a MIR trainee must be familiar with. Procedures and methods of use may be looked up in the documents and guidelines published primarily by the ESGE and ASGE.

1. Biopsy forceps. Types and sizes. Indications, complications and how to treat them.
2. **Cytology brushes.** Brushing technique and processing of the material recovered.

   - Indigo carmine.
   - Methylene blue.
   - Lugol’s solution.
   - Toluidine blue.
   - Acetic acid.
   - Gentian violet.
   - Crystal violet.
   - Phenol red.

4. **Injection needles.** Types, materials, diameter, length.

5. **Polypectomy snares.** Flexibility and rigidity. Sizes and shapes. Monofilament and braided snares.

6. **Power sources.** Operation basics.

7. **Electrocoagulation forceps.** Types. Energy delivery.

8. **Clips.** Models and types.


10. **Net retrievers** for polyps and/or foreign bodies.

11. **Dilation systems.** Hydrostatic and pneumatic balloons. Rigid dilators.

12. **Accessories for foreign body removal.** Various types.

13. **Overtubes.** Hoods.

14. **Argon plasma coagulation catheters.** Types. Use and operation.

**Technical skills that must be developed to achieve competence in diagnostic EGD**

1. Intubation under direct visualization. Intubation in the lateral and supine positions.

2. Tactile or digital esophageal intubation.

3. Descent and esophageal inspection.

4. Visualization and transit through the cardia and ora serrata.

5. Gastric examination routine. Descent along the body. Anatomical hallmarks: gastric anterior wall, gastric posterior wall, greater curvature, lesser curvature. Gastric fold examination. **Incisura angularis** examination. Antral examination.
6. Pyloric passage technique. Accessing and examining the duodenal bulb.
7. Endoscope rotation for accessing the second portion of the duodenum.
8. Gastric body examination on endoscope withdrawal.
10. Image recording routine.
11. Biopsy sample collection for histology:
   a. Biopsy sample collection for Barrett’s esophagus.
   b. Biopsy sample collection for chronic atrophic gastritis (Sidney protocol).
   c. Biopsy sample collection for gastric ulcer.
   d. Biopsy sample collection for malabsorptive conditions.
   e. Biopsy sample collection for the study of eosinophilic esophagitis.
   f. Biopsy sample collection for the study of GVHD.
13. Biopsy sample collection for infection with *Helicobacter pylori*.
   a. Understanding indications of endoscopic submucosal dissection (ESD) and endoscopic mucosal resection (EMR), for gastric superficial premalignant or malignant lesions.
15. Gastric polyps.
   a. Histologic types and management.

**Technical skills that must be developed to achieve competence in basic therapeutic EGD**

1. *Hemostatic injection*. Technique and vasoconstrictor agents for the treatment or prevention of GI bleeding (18,19).
2. *Thermal strategies for the treatment or prevention of bleeding*. In addition to the technique and materials, the use and operation of electric power sources should be understood (20,21).
3. *Clip placement*. Technique for bleeding control, orifice closure, resection beds or perforations (22).

5. Use of **argon plasma coagulation** for the management of vascular malformations and selected cases of tissue ablation. Settings in different organs. Precautions and complications (24).

6. **PEG** execution together with a senior endoscopist.

7. **Foreign body removal.** Device types. Use of overtubes. Execution routine.

8. **Understanding stricture dilation** with hydrostatic balloons, with and without radiographic control.

9. **Understanding stent placement.** Materials, types, techniques.


Regarding the therapeutic procedures mentioned in points 8 and 9, a specialist-in-training must be familiar with them and understand their performance, as well as the materials that may be involved, but is not required to have carried them out. Both stent placement and dilation often require understanding the operation of a radiology room, which adds a new chapter involving radiographic imaging in combination with endoscopic visualization. We consider that such combination procedures may well be learned at a higher level of training. The removal of foreign bodies is an endoscopic therapy that cannot be included in a working schedule. This usually consists of an emergency procedure, and specialists-in-training should take advantage of cases presenting during on-call duty, and proceed to remove any involved foreign bodies under the supervision of a senior staff member.

Table 3 summarizes the knowledge and technical skills that are key for the mastering of EGD.

**Colonoscopy**

*Theoretical knowledge that must be acquired to achieve competence in diagnostic colonoscopy (25)*

1. Understanding **pelvic, anal, and internal and external anal sphincter anatomy**, as well as rectal intubation with a flexible endoscope (26).
2. Understanding *colonic and mesothelial anatomy*, and the arrangement of arterial and venous vessel systems.
3. Understanding the anatomy of the areas *adjacent* to the lower GI tract.
4. Understanding the *histology* and layers of the large bowel wall.
5. Understanding a *colonoscope’s structure*. Mechanical, electronic, lighting, and optical components.
6. Understanding colonoscopy *indications*.
7. Understanding colonoscopy *contraindications*.
9. Understanding colonoscopy *complications*.
10. Understanding *normal endoscopic findings* and normal variants found during colonoscopy.
11. Understanding *malformations* and embryonic development abnormalities of the lower digestive system.
12. Understanding the *postsurgical anatomy* of the colon.
13. Understanding *diagnostic and therapeutic alternatives* to colonoscopy.
14. Implications of *position changes and pressure maneuvers* during colonoscopy (27,28).
15. Guidelines for *image and video recording*.
16. Indications of *antibiotic prophylaxis* for colonoscopy.
17. Understanding risk for cardiovascular complications in patients receiving *antiplatelet or antithrombotic agents* (12,13).
19. Understanding *informed consent* as related to colonoscopy and its associated therapeutic procedures.
20. *Communicating endoscopic findings to patients* and their relatives, and providing recommendations for future care.
22. Understanding familial and hereditary colon cancer as well as familial adenomatous polyposis and its attenuated form, Lynch syndrome. Understanding management, follow-up and therapeutic procedures.

23. Understanding and differentiating between Crohn’s disease and ulcerative colitis.

Findings, level of activity, cancer risk, and early detection routine.

24. Understanding major colonic diseases:
   b. Bacterial, viral infection; sexually transmitted diseases.
   c. Antibiotic-associated colitis.
   e. Malignancies.
   f. Diverticular disease.
   g. Subepithelial lesions.
   h. Ischemic lesions.
   i. Post-radiotherapy injury.
   j. Hemorrhoids, anal fissure, fistula.
   k. Drug-induced conditions.
   l. Solitary rectal ulcer, GvHD.

Knowledge of ancillary materials for diagnostic and therapeutic colonoscopy

This section lists the instruments and materials a physician-in-training must be familiar with. Procedures and methods of use may be looked up in the documents and guidelines published primarily by the ESGE and ASGE.

1. Biopsy forceps. Types and sizes. Indications, complications and how to treat them.
2. Cytology brushes. Brushing technique and processing of recovered material.
   a. Indigo carmine.
   b. Methylene blue.
   c. Lugol’s solution.
   d. Toluidine blue.
   e. Acetic acid.
f. Gentian violet.
g. Crystal violet.
h. Phenol red.


6. Injection needles. Types, dimensions, length.

7. Argon plasma coagulation catheters. Modes of application and operation.


10. Net retrievers for polyps and/or foreign bodies.

11. Pneumatic dilation balloons.

12. Guidewires and guidewire catheters.


14. Caps and devices to enhance visual field between folds, and visualize their proximal aspects.

15. Sterile carbon particles for endoscopic tattooing.

**Technical skills that must be developed to achieve competence in diagnostic colonoscopy**

1. External anal and anal canal inspection, digital rectal exam.

2. Rectal intubation technique (29).


4. Endoscope progression with and without manual external assistance (31).

5. Understanding the “one-hand” and “two-hand” techniques during colonoscopy without an assistant.

6. Progression along the sigmoid colon. Colonoscope rotation maneuvers with the hand holding the insertion segment.

7. Progression through “blind” spots and colon angles.


10. Avoiding loop formation. Abdominal pressure maneuvers and position changes to manage loop formation. Importance of aspiration and correction maneuvers.

11. Effect of aspiration on colonoscope progression and advancement.

12. Cecal intubation and examination. The cecum must be fully explored, and the appendiceal orifice identified. Aspiration and cleansing of the cecal bottom to allow detailed mucosal examination.

13. Ileal intubation. Ileal intubation technique and required position changes and pressure maneuvers.

14. Endoscope withdrawal. Withdrawal time (not < 6 minutes in colorectal cancer screening programs. Detailed examination by circumferential segment routine. Aspiration of residual gas to minimize post-procedural discomfort, particularly when air rather than CO2 was insufflated.

15. Use of caps and devices to enhance visualization of blind areas in the proximal aspects of folds.


17. Retroversion technique. In the rectum, in the ascending colon.


19. Biopsy sample collection for histology:
   a. When taking a biopsy to diagnose a malignancy, areas most likely to include malignant tissue should be selected, and an adequate number of samples should be taken.
   b. Microscopic colitis routine.
   c. GvHD routine.
   d. Method used in the study of long-standing ulcerative colitis. Use of topical chromoendoscopy for targeted biopsy taking.


21. Cytology technique.


23. Estimating polyp size. This may be performed by comparing polyps with a well-known measure, such as an open biopsy forceps (6-7 mm), the diameter of a polypectomy snare catheter (2 mm), or an open polypectomy snare.
**Technical skills that must be developed to achieve competence in therapeutic colonoscopy**

1. *Simple polypectomy* with a diathermy loop. Cold snare and monopolar electrocoagulation. Coordination with assistants. Resection approach: advancement and withdrawal techniques. Resection bed examination. Identifying and managing difficult-to-resect polyps and/or complication risk: polyps covering more than one fold, polyps involving over one-third of the colonic circumference, large pedunculated polyps, pedunculated polyps with a wide stalk (33-35).

2. *Polyp retrieval* techniques:
   a. Aspiration through the working cannal.
   b. With a diathermy loop.
   c. Using a net retriever.
   d. Sustained aspiration on the endoscope’s distal end.

3. *Submucosal injection* of indigo carmine to lift flat or sessile lesions prior to EMR. Injected substances: saline solution, osmotic substances, adrenaline solution. Injection techniques: needle puncture + removal, injection from the intestinal lumen + direct access to the submucosa (36,37).


5. *Post-polypectomy bleeding*:
   a. Polyp stalk re-resection.
   b. Delivering hemostatic vasoconstriction with an injection needle.
   c. Clip application.
   d. Forceps electrocoagulation.
   e. Plastic endoloop application for bleeding prevention.
   f. Argon plasma coagulation hemostasis.
   g. Hemostasis using a polypectomy snare’s end.

6. Mucosal ablation with *argon plasma coagulation* (39).

7. Tissue ablation for potential polyp remnants at a resection bed using a polypectomy snare’s end.

8. *Clip placement* for:
   a. Hemostasis.
b. Perforation closure.
c. A lesion in the muscularis propria.
d. Reducing or closing resection beds after polypectomy.

10. Lesion tattooing with sterile carbon particles.

Table 4 summarizes the knowledge and technical skills that are crucial for colonoscopy.

Assessing competence in digestive endoscopy
The current training program in gastroenterology (Order SAS/2854/2009) is intended to educate physicians so they achieve the necessary competence and skills to practice their specialty and keep their knowledge up-to-date through continuing learning (1).

The ASGE considers that adequate training in digestive endoscopy is critical in the formation of qualified endoscopists, and that consistent education programs are needed to this end and to ultimately provide high-quality endoscopy services. Systems are available to assess the level of competence acquired. Back in 2014, the ASGE designed competence assessment forms for EGD and colonoscopy under the heading Mayo Colonoscopy and EGD Skill Assessment Toll, which were intended to unify evaluation items (40).

Concurrently, the UK’s Joint Advisory Group on Gastrointestinal Endoscopy (JAG) proposed using various tools for the assessment of competence in endoscopy (9):

- Number of procedures performed and recorded in a portfolio.
- Evaluation of competence in digestive endoscopy:
  - Direct observation of endoscopic procedures.
  - Mini-Cex (clinical evaluation exercise) including the supervision of real-world cases by the specialist-in-training, with assessment of various items.
  - 360° evaluation, a method where trainees are evaluated by all the people they are involved with on their daily practice (physicians, nurses, nursing assistants, patients).
- List of all skills objectively assessable in a structured manner during an endoscopic procedure.
Similarly, the ESBGH suggests the following for digestive endoscopy training (6):

- Clinical basics, general skills, and knowledge of endoscopy, detailing the various items to consider as regards safe endoscopy.
- Endoscopic skills in diagnostic and basic therapeutic gastroscopy and colonoscopy.
- A minimum number of endoscopic procedures a trainee should perform is suggested.

Therefore, we consider that, taking the Spanish training program and scientific societies as a reference (41), we are in the right position to propose a model for the assessment of competence in gastroscopy and colonoscopy, using well-defined items (Figs. 1 and 2) in the accreditation of appropriate endoscopy training.

REFERENCES

1. Real Decreto 1843/2008 del 8 de febrero, por el que se determinan y clasifican las especialidades de Ciencias de la Salud y se desarrollan determinados aspectos del sistema de formación sanitaria especializada. BOE-A-2008-3176.


Table 1. Digestive endoscopy. Classification according to purpose and topography

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Topography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>Esophagogastroduodenoscopy (EGD)</td>
</tr>
<tr>
<td>Therapeutic</td>
<td></td>
</tr>
<tr>
<td>Echoendoscopy (EUS)</td>
<td></td>
</tr>
<tr>
<td>Enteroscopy, capsule endoscopy</td>
<td></td>
</tr>
</tbody>
</table>
## Table 2. Minimum number of procedures recommended in the gastroenterology MIR program

<table>
<thead>
<tr>
<th>Endoscopic technique</th>
<th>Blue Book</th>
<th>European Union</th>
<th>BOE 2009</th>
<th>SEED 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophagogastroduodenoscopy</td>
<td>200</td>
<td>150</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Hemostasis for varices and other upper gastrointestinal bleeding (UGIB) causes</td>
<td>30</td>
<td>50</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total colonoscopy</td>
<td>200</td>
<td>150</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Sigmoidoscopy</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectoscopy</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polypectomy and hemostasis techniques in the colon</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Balloon dilation for the upper and lower GI tract</td>
<td>10</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percutaneous endoscopic gastrostomy (PEG)</td>
<td>15</td>
<td>10</td>
<td>5-15</td>
<td></td>
</tr>
<tr>
<td>Removal of foreign bodies</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BOE: Spanish Official State Gazette.
Table 3. Esophagogastroduodenoscopy. Key knowledge and technical skills in the gastroenterology MIR program

<table>
<thead>
<tr>
<th>Knowledge of theory</th>
<th>Knowledge of materials</th>
<th>Diagnostic skills</th>
<th>Therapeutic skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy of hypopharynx</td>
<td>Biopsy forceps</td>
<td>Direct view intubation</td>
<td>Hemostatic injection</td>
</tr>
<tr>
<td>Anatomy of upper tract</td>
<td>Cytology brush</td>
<td>Tactile intubation</td>
<td>Argon plasma coagulation</td>
</tr>
<tr>
<td>Histology of upper tract</td>
<td>Chromoendoscopy spray catheter</td>
<td>Esophageal descent</td>
<td>Thermal coagulation</td>
</tr>
<tr>
<td>Indications</td>
<td>Injection needles</td>
<td>Cardia</td>
<td>Variceal ligation</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Argon plasma coagulation catheter</td>
<td>Gastric examination</td>
<td>Percutaneous gastrostomy</td>
</tr>
<tr>
<td>Complications</td>
<td>Argon plasma coagulation catheter</td>
<td>Pylorus</td>
<td>Removal of foreign bodies</td>
</tr>
<tr>
<td>Normality and variants</td>
<td>Polypectomy snares</td>
<td>Duodenal bulb examination</td>
<td>Stricture dilation</td>
</tr>
<tr>
<td>Malformations</td>
<td>Electrocoagulation sources</td>
<td>Passage to second portion</td>
<td>Stent deployment</td>
</tr>
<tr>
<td>Diagnostic alternatives</td>
<td>Electrocoagulation forceps</td>
<td>Image recording</td>
<td></td>
</tr>
<tr>
<td>Obstructed airway. Transcendence</td>
<td>Clips</td>
<td>Biopsy</td>
<td></td>
</tr>
<tr>
<td>Informed consent</td>
<td>Elastic bands</td>
<td>Helicobacter pylori</td>
<td></td>
</tr>
<tr>
<td>Reports, images, videos</td>
<td>Polyp retrievers</td>
<td>Cytology</td>
<td></td>
</tr>
<tr>
<td>Antibiotic prophylaxis and anticoagulants</td>
<td>Overtubes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major diseases (see text)</td>
<td>Devices for foreign bodies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dilation materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Materials for percutaneous endoscopic gastrostomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stent materials and types</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cleaning accessories</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Understanding + having performed the technique**

**Understanding and knowing**
Table 4. Colonoscopy. Key knowledge and technical skills in the gastroenterology MIR program

<table>
<thead>
<tr>
<th>Knowledge of theory</th>
<th>Knowledge of materials</th>
<th>Diagnostic skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy of pelvis, anal sphincter</td>
<td>Biopsy forceps</td>
<td>Anal examination</td>
</tr>
<tr>
<td>Anatomy of colon, vascular territories</td>
<td>Cytology brush</td>
<td>Rectal intubation</td>
</tr>
<tr>
<td>Anatomy adjacent to the colon</td>
<td>Chromoendoscopy spray catheter</td>
<td>Colostomy intubation</td>
</tr>
<tr>
<td>Wall histology and components</td>
<td>Injection needles</td>
<td>Progression w/wo assistant</td>
</tr>
<tr>
<td>Indications</td>
<td>Argon plasma coagulation catheter</td>
<td>“Blind” segments and angles</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Argon plasma coagulation</td>
<td>Negotiating diverticula</td>
</tr>
<tr>
<td>Colonoscopy preparation-cleansing</td>
<td>Polypectomy snares</td>
<td>Rectifying loops. Maneuvers</td>
</tr>
<tr>
<td>Complications</td>
<td>Electrocoagulation sources</td>
<td>Effect of aspiration on progression</td>
</tr>
<tr>
<td>Normality. Normal variants</td>
<td>Electrocoagulation forceps</td>
<td>Cecal examination</td>
</tr>
<tr>
<td>Post-surgical changes</td>
<td>Clips</td>
<td>Ileal intubation</td>
</tr>
<tr>
<td>Diagnostic alternatives</td>
<td>Polyp retrievers</td>
<td>Withdrawal. Technique and time</td>
</tr>
<tr>
<td>Position changes. Pressure maneuvers</td>
<td>Caps</td>
<td>Retroversion. Rectum and ascending colon</td>
</tr>
<tr>
<td>Informed consent</td>
<td>Balloon dilation</td>
<td>Recording images and video</td>
</tr>
<tr>
<td>Reports, images, videos</td>
<td>Removal of foreign bodies</td>
<td>Chromoendoscopy</td>
</tr>
<tr>
<td>Malformations and embryonic abnormalities</td>
<td>Endoscope cleaning accessories</td>
<td>Tattooing. Technique</td>
</tr>
<tr>
<td>Antibiotic prophylaxis and anticoagulants</td>
<td></td>
<td>Biopsy and cytology</td>
</tr>
<tr>
<td>Major colon diseases</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Understanding + having performed the technique**

**Understanding and knowing**
Fig. 1. Assessment of competence in esophagogastroduodenoscopy.

<table>
<thead>
<tr>
<th>Physician in training:</th>
<th>Year of residency:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Responsible staff:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of procedure:</th>
<th>Time (min):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Much lower than expected</th>
<th>Lower than expected</th>
<th>Satisfactory</th>
<th>Higher than expected</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of indication. Medical history review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informed consent (discussion and risks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing discomfort (intimacy, post-procedure relaxation, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedation (pre and post)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral intubation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advancement techniques</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucosal view (key areas, retroversion)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesion identification (description and interpretation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biopsy collection (location and number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapeutic skills (hemostasis and polypectomy)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and exam interpretation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication with patient/relatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. 2. Assessment of competence in colonoscopy.

<table>
<thead>
<tr>
<th>Physician in training:</th>
<th>Year of residency:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Responsible staff:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure date:</th>
<th>Time (min):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Much lower than expected</th>
<th>Lower than expected</th>
<th>Satisfactory</th>
<th>Higher than expected</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of indication. Medical history review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informed consent (discussion and risks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing discomfort (intimacy, post-procedure relaxation, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedation (pre and post)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anal intubation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advancement techniques</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucosal view (key areas, retroversion)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesion identification (description and interpretation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biopsy collection (location and number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapeutic skills (hemostasis, polypectomy, tattooing)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and exam interpretation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication with patient/relatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>