Pediatric gastrointestinal endoscopy: European Society of Gastrointestinal Endoscopy (ESGE) and European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) Guideline Executive summary

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Bibliography

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ABSTRACT

This Executive summary of the Guideline on pediatric gastrointestinal endoscopy from the European Society of Gastrointestinal Endoscopy (ESGE) and the European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) refers to infants, children, and adolescents aged 0–18 years. The areas covered include: indications for diagnostic and therapeutic esophagogastroduodenoscopy and ileocolonoscopy; endoscopy for foreign body ingestion; endoscopic management of corrosive ingestion and stricture/stenosis; upper and lower gastrointestinal bleeding; endoscopic retrograde cholangiopancreatography, and endoscopic ultrasonography. Percutaneous endoscopic gastrostomy and endoscopy specific to inflammatory bowel disease (IBD) have been dealt with in other Guidelines and are therefore not mentioned in this Guideline. Training and ongoing skill maintenance will be addressed in an imminent sister publication.

* Co-First authors
**Time definitions**

Emergent/emergency < 2 hours
Urgent/urgently < 12 hours or < 24 hours and defined in text
Early < 48 hours but may be at clinician’s discretion

**Methods**

ESGE and ESPGHAN agreed to develop a joint guideline. Two guideline leaders (A.T. for ESGE and M.T. for ESPGHAN) invited the listed authors to participate in the project. The key questions were prepared by the coordinating team (A.T., M.T., R.F., Y.V., J.-M.D.) and then approved by the other members. The coordinating team established task force subgroups, each with its own leader, and assigned the following key topics among the task forces: esophagogastroduodenoscopy (EGD) and ileocolonoscopy; foreign bodies; corrosive ingestion; corrosive ingestion and esophageal strictures/stenoses; GI bleeding; endoscopic retrograde cholangiopancreatography (ERCP); and endoscopic ultrasonography (EUS). Each task force performed a systematic literature search to prepare evidence-based and well-balanced statements on their assigned key questions. Searches were performed in PubMed and/or EMBASE and/or Cochrane (publication date from 2000 to May 2015, or before if strictly needed), including as a minimum the key words “pediatric” and “endoscopy.” All articles studying the application of diagnostic and therapeutic endoscopy in the pediatric age range were selected by title or abstract. The results of the relevant publications were summarized in literature tables and graded by the level of evidence and strength of recommendation according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system [5, 6]. Each task force proposed statements on their assigned key questions which were discussed and voted on during the plenary meeting held in February 2015 in Munich. In November 2015, a draft prepared by A.T., C.H. and M.T. was sent to all group members. After agreement from all the authors on a final version, the manuscript was reviewed by two members of the ESGE Governing Board, ESGE individual members and the ESPGHAN Council.

The manuscript was then submitted to the *Journal of Pediatric Gastroenterology and Nutrition* for publication in full length and to *Endoscopy* for publication of the Executive summary.
Both the Guideline and Executive summary were issued in 2016 and will be considered for review and update in 2021 or sooner if new and relevant evidence becomes available. Any updates to the Guideline or Executive summary in the interim will be noted on the ESGE and ESPGHAN websites: http://www.esge.com/esge-guidelines.html and http://www.espghan.org/guidelines/

Recommendations

Esophagogastroduodenoscopy (EGD)

ESGE/ESPGHAN suggest diagnostic and therapeutic EGD for the indications listed in ▶ Table 1 and ▶ Table 2, respectively. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN do not suggest EGD in the case of uncomplicated gastroesophageal reflux, functional gastrointestinal disorders, or for diagnosing perforation. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest routine tissue sampling even in the absence of visible endoscopic abnormalities in all children undergoing EGD. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest using ESPGHAN guidelines (on eosinophilic esophagitis, Helicobacter pylori, celiac disease, and inflammatory bowel disease [IBD]) for precise indications and preferred sites for biopsy during EGD in children suspected of a specific disease (▶ Table 3). (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest performing EGD in children under general anesthesia or, only if general anesthesia is not available, under deep sedation in a carefully monitored environment. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest performing EGD in a child-friendly setting with appropriate equipment and by an endoscopist trained in pediatric gastroenterology. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that when adult endoscopists perform pediatric procedures, collaboration between adult gastroenterologists and pediatricians is always warranted. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that the choice of gastroscope type should depend on the child’s weight and age (▶ Table 4). (Weak recommendation, low quality evidence.)

Ileocolonoscopy

ESGE/ESPGHAN suggest ileocolonoscopy for the diagnostic and therapeutic indications listed in ▶ Table 5. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest against ileocolonoscopy in the case of toxic megacolon, recent colonic perforation (<28 days), recent intestinal resection (<7 days), or functional GI disorders. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest performing ileocolonoscopy in children under general anesthesia or, only if general anesthesia is not available, under deep sedation in a carefully monitored environment. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that ileocolonoscopy should be performed in a child-friendly setting with appropriate equipment and by an endoscopist trained in pediatric gastroenterology. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that when non-pediatric endoscopists perform pediatric procedures in older children, collaboration with a pediatrician is always warranted. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that the choice of colonoscope type should depend on the child’s weight and age (▶ Table 4). (Weak recommendation, low quality evidence.)

▶ Table 1 Typical diagnostic and therapeutic indications, non-indications, and contraindications for esophagogastroduodenoscopy (EGD) in pediatric patients.

<table>
<thead>
<tr>
<th>Diagnostic indications</th>
<th>Weight loss, failure to thrive</th>
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<tbody>
<tr>
<td></td>
<td>Unexplained anemia</td>
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<tr>
<td></td>
<td>Abdominal pain with suspicion of an organic disease</td>
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<tr>
<td></td>
<td>Dysphagia or odynophagia</td>
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<td></td>
<td>Caustic ingestion</td>
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<td></td>
<td>Recurrent vomiting with unknown cause</td>
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<td></td>
<td>Hematemesis</td>
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<td>Hematochezia</td>
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<td></td>
<td>Unexplained chronic diarrhea</td>
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<td></td>
<td>Suspicion of graft versus host disease</td>
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<tr>
<td>Therapeutic indications</td>
<td>Percutaneous endoscopic gastrostomy (re)placement</td>
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<tr>
<td></td>
<td>Duodenal tube placement</td>
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<td></td>
<td>Foreign body removal</td>
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<td></td>
<td>Food impaction</td>
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<tr>
<td></td>
<td>Hemostasis</td>
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<td></td>
<td>Percutaneous jejunostomy placement</td>
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<td></td>
<td>Esophageal varices</td>
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<td></td>
<td>Dilation of esophageal or upper GI strictures</td>
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<tr>
<td></td>
<td>Perforation</td>
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<tr>
<td></td>
<td>Achalasia</td>
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<tr>
<td></td>
<td>Polypectomy</td>
</tr>
<tr>
<td>Non-indications</td>
<td>Uncomplicated GERD</td>
</tr>
<tr>
<td></td>
<td>Functional GI disorders</td>
</tr>
<tr>
<td>Contraindications</td>
<td>To diagnose perforation</td>
</tr>
</tbody>
</table>

GERD, gastroesophageal reflux disease; GI, gastrointestinal

Bowel preparation for ileocolonoscopy in children

ESGE/ESPGHAN recommend low-volume preparation for bowel cleansing in children, using either polyethylene glycol plus ascorbate or picosulphate plus magnesium citrate/Senokot. (Strong recommendation, high quality evidence.)

ESGE/ESPGHAN recommend against the use of sodium phosphate for bowel cleansing. (Strong recommendation, high quality evidence.)

Ileocolonoscopy in children: biopsy, carbon dioxide insufflation, ileal intubation, polypectomy technique

ESGE/ESPGHAN suggest routine biopsy even in the absence of visible endoscopic abnormalities in all children with suspected IBD undergoing ileocolonoscopy. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest using ESPGHAN guidelines relating to ulcerative colitis and the revised Porto criteria for diagnosis of IBD for precise indications and preferred sites to biopsy. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN did not find any evidence to recommend against or for the use of routine carbon dioxide insufflation during ileocolonoscopy in children. Pain seems to be rare and mild after ileocolonoscopy in children. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that ileal intubation should be attempted in symptomatic children with abdominal pain, intestinal bleeding, diarrhea, or with any suspicion of IBD. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest removal of very small polyps (< 3 mm) by cold biopsy forceps and 3–8 mm polyps by hot or cold snaring. Cold snaring is advisable in the right colon where the perforation risk is higher. For polyps > 8 mm, hot snaring is suggested. (Weak recommendation, low quality evidence.)

Foreign body ingestion

ESGE/ESPGHAN recommend an early referral to the emergency room and X-ray evaluation in all patients with suspected foreign body ingestion even if asymptomatic. Biplane radiographs should be obtained of the neck, chest, abdomen, and pelvis if

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Diagnostic indications for esophagogastroduodenoscopy (EGD) in pediatric patients: symptoms/signs according to suspected disease.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms/signs</td>
<td>Suspicion of:</td>
</tr>
<tr>
<td>Weight loss, failure to thrive, chronic diarrhea, malabsorption, anemia, abdominal pain with suspicion of an organic disease</td>
<td>Celiac disease or IBD, giardiasis, allergic enterocolitis, bleeding lesions, graft versus host disease</td>
</tr>
<tr>
<td>Dysphagia, odynophagia, chest pain, feeding difficulty</td>
<td>Foreign body ingestion, food impaction, caustic ingestion or eosinophilic esophagitis</td>
</tr>
<tr>
<td>Hematemesis, hematochezia, melena</td>
<td>Polyps, angiodysplasia, arteriovenous malformations, peptic ulcer with or without Helicobacter pylori infection, less common conditions such as duplication cysts</td>
</tr>
<tr>
<td>Family history of polyposis syndromes</td>
<td>Polyps (diagnostic and surveillance)</td>
</tr>
<tr>
<td>IBD, inflammatory bowel disease.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Indication and site for tissue sampling during upper and lower endoscopy in pediatric patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indication</td>
<td>Tissue samples: sites and numbers</td>
</tr>
<tr>
<td>Eosinophilic esophagitis</td>
<td>At least 3 biopsies should be taken, one from proximal mid and distal esophagus, regardless of the endoscopic appearance of the esophagus</td>
</tr>
<tr>
<td>Helicobacter pylori infection</td>
<td>2 biopsies from both the antrum and the corpus (± fundus)</td>
</tr>
<tr>
<td>Celiac disease</td>
<td>At least 1 biopsy from the duodenal bulb and at least 4 biopsies from the second or third portion of the duodenum</td>
</tr>
<tr>
<td>IBD</td>
<td>Multiple biopsies (2 or more per section) from all sections of the visualized GI tract, even in the absence of macroscopic lesions</td>
</tr>
<tr>
<td>IBD, inflammatory bowel disease; GI, gastrointestinal.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Types of endoscopes used in pediatric patients according to body weight, age, and procedure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGD</td>
<td>Colonscopy</td>
</tr>
<tr>
<td>Weight or age</td>
<td>≤ 6 mm gastroscope preferred. Consider standard adult gastroscope if endotherapy required.</td>
</tr>
<tr>
<td>≥ 10 kg or ≥ 1 year</td>
<td>Standard adult gastroscope. Therapeutic gastroscope if needed.</td>
</tr>
<tr>
<td>≥ 15 kg or ≥ 3 years</td>
<td>–</td>
</tr>
<tr>
<td>EGD, esophagogastroduodenoscopy; ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultrasonography; EBUS, endobronchial ultrasound.</td>
<td></td>
</tr>
</tbody>
</table>
Computed tomography (CT) scan can be considered for radiolucent foreign bodies. (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN suggest early EGD if the foreign body is in the esophagus. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN recommend removal of blunt foreign bodies and coins or impacted food from the esophagus urgently (< 24 hours), even in asymptomatic children. If the child is symptomatic an emergent (< 2 hours) removal is indicated especially for button batteries. (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN suggest removal of blunt foreign bodies from the stomach or duodenum if the child is symptomatic or if the object is wider than 2.5 cm in diameter or > 6 cm in length. Otherwise, blunt foreign bodies in the stomach can be followed and retrieved only if they produce symptoms or do not pass spontaneously after 4 weeks. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN recommend emergent (< 2 hours) removal of sharp-pointed objects located in the esophagus (all cases). (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN recommend emergent (< 2 hours) removal of sharp-pointed objects in the stomach or proximal duodenum even in asymptomatic children. (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN recommend emergent (< 2 hours) removal of button batteries impacted in the esophagus. (Strong recommendation, low quality evidence.)

ESGE/ESPGHAN suggest to remove button batteries in the stomach emergently (< 2 hours) if the child is symptomatic and/or has a known or suspected anatomical pathology in the GI tract (e.g. Meckel’s diverticulum), and/or has simultaneously swallowed a magnet. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that button batteries larger than > 20 mm present in the stomach should be checked by radiography and removed if still in place after more than 48 hours. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN recommend an urgent endoscopic removal (< 24 hours) for single cylindrical battery ingestion when impacted in the esophagus and as soon as possible elsewhere in the GI tract when the child is symptomatic. (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN suggest that a single cylindrical battery in the stomach can be observed and the child monitored as an outpatient and followed by X-ray 7 – 14 days after ingestion if the battery is not passed in the stool. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN recommend urgent (< 24 hours) removal of all magnets within endoscopic reach. For those beyond endoscopic reach, close observation and surgical consultation for non-progression through the GI tract is advised. (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN recommend removal of impacted food from the esophagus as an emergency 2 hours from the time of presentation (and ideally from the time of ingestion) in case of symptoms (drooling, neck pain). If the child is asymptomatic an urgent (< 24 hours) removal is indicated. (Strong recommendation, moderate quality evidence.)

ESGE/ESPGHAN suggest investigation for underlying pathology of the esophagus in all cases of food impaction. (Weak recommendation, low quality evidence.)

<table>
<thead>
<tr>
<th>Diagnostic indications</th>
<th>Unexplained anemia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unexplained chronic diarrhea</td>
</tr>
<tr>
<td></td>
<td>Perianal lesions (fistula, abscess)</td>
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<td></td>
<td>Rectal blood loss</td>
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<td></td>
<td>Unexplained failure to thrive</td>
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<td></td>
<td>Suspicion of graft versus host disease</td>
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<td></td>
<td>Rejection or complications after intestinal transplantation</td>
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<td></td>
<td>Radiological suspicion of ileocolonic stenosis/stricture</td>
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<td></td>
<td>Polyposis syndromes</td>
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<tr>
<td>Therapeutic indications</td>
<td>Polypectomy</td>
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<tr>
<td></td>
<td>Dilation of ileocolonic stenosis</td>
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<tr>
<td></td>
<td>Treatment of hemorrhagic lesions</td>
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<td></td>
<td>Foreign body removal</td>
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<td></td>
<td>Reduction of sigmoidal volvulus</td>
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<tr>
<td>Non-indications</td>
<td>Functional GI disorders</td>
</tr>
<tr>
<td></td>
<td>Constipation</td>
</tr>
<tr>
<td>CONTRAINDICATIONS</td>
<td>Toxic megacolon</td>
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<td></td>
<td>Recent colonic perforation</td>
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<td></td>
<td>Recent intestinal resection (&lt; 7 days)</td>
</tr>
</tbody>
</table>

GI, gastrointestinal.

Table 5 Typical diagnostic and therapeutic indications, non-indications, and contraindications for ileocolonoscopy in pediatric patients.
Drug packets
ESGE/ESPGHAN recommend against endoscopic removal of drug-containing packets. (Strong recommendation, low quality evidence.)

Equipment for removal of foreign bodies
ESGE/ESPGHAN suggest that flexible endoscopy is an effective and safe procedure for removing foreign bodies from the GI tract, with a high success rate using retrieval nets, polypectomy snares, and rat-tooth forceps. (Weak recommendation, very low quality evidence.)

Corrosive ingestion
ESGE/ESPGHAN suggest that every child that has ingested a corrosive substance should have a thorough follow-up, with endoscopy dictated only by symptoms, and dependent on the symptoms the timing should be within 24 hours. (Strong recommendation, high quality evidence.)
ESGE/ESPGHAN recommend that every child with a suspected caustic ingestion and symptoms/signs (any oral lesions, vomiting, drooling, dysphagia, hematemesis, dyspnea, abdominal pain, etc) should have an EGD in order to identify all consequent digestive tract lesions. (Strong recommendation, high quality evidence.)
ESGE/ESPGHAN suggest that in the case of suspected corrosive ingestion EGD is withheld if the child is asymptomatic (no drooling of saliva/other symptoms and no mouth lesions) and that adequate follow-up is assured. (Weak recommendation, moderate quality evidence.)
ESGE/ESPGHAN recommend to have the same grade of suspicion for both acidic and alkali ingestion regarding potential mucosal injury. (Alkali ingestion, especially lye, is associated with more severe esophageal lesions and severe gastric lesions can occur in acidic ingestion.) Stricture development has been associated with both acidic and alkali ingestion. (Strong recommendation, high quality evidence.)
ESGE/ESPGHAN recommend high doses of intravenous dexamethasone (1 g/1.73 m² per day) administration for a short period (3 days) in llb esophagitis after corrosive ingestion as a method of preventing the development of esophageal stricture. There is no evidence of benefit for the use of corticosteroids in other grades of esophagitis (I, IIa, III). (Strong recommendation, moderate quality evidence.)

Benign esophageal strictures
ESGE/ESPGHAN recommend esophageal dilation using balloon or bougies for benign esophageal strictures only when symptoms occur. (Strong recommendation, low quality evidence.)
ESGE/ESPGHAN suggest the following definition of a benign refractory or recurrent stricture in children: “An anatomic restriction because of cicatricial luminal compromise or fibrosis that results in dysphagia in the absence of endoscopic evidence of inflammation. This may occur as the result of either an inability to successfully remediate the anatomic problem to obtain age-appropriate feeding possibilities after a maximum of 5 dilation sessions (refractory) with maximal 4-week intervals, or as a result of an inability to maintain a satisfactory luminal diameter for 4 weeks once the age-appropriate feeding diameter has been achieved (recurrent).” (Weak recommendation, very low level of evidence.)
ESGE/ESPGHAN suggest temporary stent placement or application of topical mitomycin C (MMC) following dilation for refractory esophageal stenosis in children. ESGE/ESPGHAN do not suggest the routine use of intralesional steroids for refractory esophageal stenosis in children. (Weak recommendation, low quality evidence.)
In patients operated for esophageal atresia, ESGE/ESPGHAN suggest long-term endoscopic surveillance for Barrett’s esophagus and cancer. Frequency would be dictated by the presence or not of dysplasia and should follow standard guidelines already published in the literature. (Weak recommendation, low quality evidence.)

Upper and lower GI bleeding
ESGE/ESPGHAN suggest that, having employed all necessary medical interventions as standard, EGD be performed very early (≤ 12 h) in acute upper GI bleeding (AUGIB) cases which require ongoing circulatory support or where a large hematemesis or melena occurs. (Weak recommendation, low quality evidence.)
ESGE/ESPGHAN recommend that, having employed all necessary medical interventions as standard, EGD be performed very early (<12 h) in AUGIB in cases with known esophageal varices. (Strong recommendation, moderate quality evidence.)
ESGE/ESPGHAN suggest that, having employed all necessary medical interventions as standard, EGD be performed within 24 hours in AUGIB cases which require transfusion due to hemoglobin drop below 8 g/dL, where an acute drop of 2 g/dL is identified, and in those who are stable but whose bleeding score is above a recognized threshold/validated score for probable endoscopic intervention requirement. (Weak recommendation, moderate quality evidence.)
ESGE/ESPGHAN suggest that EGD be performed before hospital discharge in children with AUGIB and pre-existing liver disease or portal hypertension. (Weak recommendation, low quality evidence.)
ESGE/ESPGHAN do not suggest routine use of wireless capsule endoscopy/enteroscopy in AUGIB in children. (Weak recommendation, moderate quality evidence.)
ESGE/ESPGHAN suggest that urgent (24 hours) therapeutic ileocolonoscopy is not usually necessary in lower GI bleeding unless severe enough to cause circulatory compromise but diagnostic ileocolonoscopy is needed as soon as is practical and safe. (Weak recommendation, weak quality evidence.)

Endoscopic hemostasis technique for GI bleeding in children
ESGE/ESPGHAN recommend hemostasis of esophageal variceal bleeding in children, using band ligation, if feasible, or sclerotherapy as an alternative. (Strong recommendation, moderate quality evidence.)
ESGE/ESPGHAN suggest that the treatment of peptic ulcers and Dieulafoy’s lesion should not be carried out with epinephrine injection alone but in combination with thermal or me-
chanical techniques. (Weak recommendation, low quality evi-

dence.)

ESGE/ESPGHAN suggest adopting general anesthesia in chil-
dren undergoing endoscopy for GI bleeding. General anesthe-
sia is recommended in the case of variceal bleeding. Deep seda-
tion may be used in less severe bleeding in older children.
(Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest using video capsule endoscopy
(VCE) in children in the case of suspected small-intestinal
bleeding and in addition balloon enteroscopy for therapeutic
purposes. (Weak recommendation, moderate quality evi-
dence.)

Endoscopic retrograde cholangiopancreatography
(ERCP)

ESGE/ESPGHAN suggest ERCP in pediatric patients (>1-year-
old) for therapeutic purposes following diagnostic information
from non-invasive diagnostic modalities such as magnetic reso-
nance cholangiopancreatography (MRCP). Diagnostic ERCP can
be considered in selected cases where advanced non-invasive
imaging is inconclusive. (Weak recommendation, low quality
evidence.)

ESGE/ESPGHAN recommend that therapeutic ERCP in pedia-
tric patients (>1-year-old) is considered for diseases listed in
▶ Table 6 following diagnostic information from non-invasive
modalities such as MRCP. Results and complication rates of
ERCP in children are similar to those reported in adults. (Weak
recommendation, low quality evidence.)

ESGE/ESPGHAN suggest that diagnostic ERCP in neonates
and infants (<1-year-old) with cholestatic hepatobiliary disease
is considered if non-invasive investigations are not conclusive
in order to allow timely referral to surgery for suspected biliary
atresia or to avoid unnecessary surgery if biliary atresia is ex-
cluded. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN recommend that ERCP in children is per-
formed by an experienced endoscopist, in a high-volume ter-

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Typical indications for ERCP in pediatric patients.</th>
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<tbody>
<tr>
<td>Biliary</td>
<td>Pancreatic</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>Therapeutic</td>
</tr>
<tr>
<td>Cholestasis in neonates and infants</td>
<td>Common bile duct stones</td>
</tr>
<tr>
<td>Choledochal cyst</td>
<td>Bile leak (post-surgical/post-traumatic)</td>
</tr>
<tr>
<td>Primary sclerosing cholangitis (brush cytology)</td>
<td>Benign biliary strictures</td>
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<tr>
<td>Primary sclerosing cholangitis</td>
<td></td>
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<tr>
<td>Malignant biliary strictures</td>
<td></td>
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<tr>
<td>Parasitosis (ascariasis, fasciolasis)</td>
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</tbody>
</table>

ERCP, endoscopic retrograde cholangiopancreatography

trary care center, and with pediatric involvement. (Strong re-

commendation, moderate quality evidence.)

ESGE/ESPGHAN suggest general anesthesia for ERCP in chil-
dren. Deep/conscious sedation can be considered for teenagers
(age 12–17 years) although general anesthesia is the preferred
choice. (Weak recommendation, low quality evidence.)

Prophylaxis of post-ERCP pancreatitis with non-steroidal
anti-inflammatory drugs (NSAIDs) (diclofenac/indomethacin
suppository) is recommended in children older than 14 years.
(Strong recommendation, high quality evidence.)

Protection of radiosensitive organs (thyroid gland,
breasts, gonads and eyes) is recommended together with ad-
justment of collimation to the smaller size of children. (Strong
recommendation, high quality evidence.)

ESGE/ESPGHAN recommend the pediatric 7.5-mm duode-
noscope for children weighing <10kg and that a therapeutic
duodenoscope can be used in those weighing ≥10kg. (Strong
recommendation, low quality evidence.)

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Typical indications for endoscopic ultrasonography in pediatric patients.</th>
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<td>Esophagus</td>
<td>Stomach</td>
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<td>Congenital esophageal stenosis</td>
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<td>Eosinophilic esophagitis</td>
<td>Gastric varices</td>
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<td>Esophageal duplications</td>
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FNA, fine-needle aspiration.
Endoscopic ultrasonography (EUS)

The endobronchial ultrasound (EBUS) endoscope can be adapted for EUS in children with a weight below 15 kg. A standard linear echoendoscope should only be employed in children under general anesthesia, considering the stiff and potentially traumatic distal part. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest the use of EUS in children only in tertiary referral centers with experience in therapeutic endoscopy. Strict collaboration between adult and pediatric gastroenterologists is required in the case of EUS with standard echoendoscopes. (Weak recommendation, low quality evidence.)

ESGE/ESPGHAN suggest the use of radial EUS with minibal probes to diagnose congenital esophageal strictures (tracheobronchial remnants vs. fibromuscular stenosis subtypes). (Weak recommendation, very low quality evidence.)

ESGE/ESPGHAN suggest consideration of EUS for the diagnosis of pancreaticobiliary diseases in children where non-invasive imaging modalities (ultrasonography, MRCP) are inconclusive (Table 7). (Weak recommendation, very low quality evidence.)

ESGE/ESPGHAN suggest that EUS-guided drainage of pancreatic pseudocysts in children should be performed in large EUS centers with specific experience and expertise. (Weak recommendation, low quality evidence.)

ESGE and ESPGHAN guidelines represent a consensus of best practice based on the available evidence at the time of preparation. They may not apply in all situations and should be interpreted in the light of specific clinical situations and resource availability. Further controlled clinical studies may be needed to clarify aspects of these statements, and revision may be necessary as new data appear. Clinical considerations may justify a course of action at variance to these recommendations. ESGE and ESPGHAN guidelines are intended to be an educational device to provide information that may assist endoscopists in providing care to patients. They are not rules and should not be construed as establishing a legal standard of care or as encouraging, advocating, requiring, or discouraging any particular treatment.

Competing interests

M.Th. has participated as a clinical investigator and/or advisory board member and/or consultant and/or speaker and/or for Danone/Nutricia, Nestlé, Mead Johnson, Movetis, Janssen, Norgine, Reckitt-Benkeiser, Cook, Olympus, KeyMed, Fujinon, Storz, Pentax and Boston-Scientific.

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References