

# European Curriculum for Sedation Training in Gastrointestinal Endoscopy: Position Statement of the European Society of Gastrointestinal Endoscopy (ESGE) and European Society of Gastroenterology and Endoscopy Nurses and Associates (ESGENA)



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## Institutions

Institutions are listed at the end of article.

## Bibliography

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## 1. Introduction

For more than 30 years, sedation using benzodiazepines, combined or not with opioids, has been used as a standard regimen for gastrointestinal endoscopy; it is usually referred to as traditional sedation. Sedation management in gastrointestinal endoscopy varies between European countries according to the different legal frameworks and different healthcare systems. In the majority of European countries, endoscopists administer sedation with support from endoscopy nurses, while in some countries such as France only anesthesiologists administer intravenous sedation. In some countries any sedation can be administered by all trained clinicians, while in other countries administration of propofol can only be performed by anesthesiologists. Therefore, because of national legal restrictions, non-anesthesiologist administration of propofol (NAAP) has been established in only a few European countries, including Austria, Denmark, Germany, Greece, the Netherlands, Sweden, and Switzerland [1–9]. Irrespective of the type of sedation used, quality management requires pharmacologically appropriate training for all clinical staff involved in sedation practice. Individual qualifications, human resources and technical requirements have already been addressed in different guidelines [5, 10–17].

The German courses based on the national sedation curriculum combine sedation and emergency management, irrespective of the agent used for sedation (e.g., propofol, benzodiazepine, or combined medications) [18]. The nationwide implementation of these courses has significantly improved quality with regard to structure in German gastrointestinal endoscopy departments [19]. In Denmark, a training program for proce-

dural sedation and analgesia (PSA) has been implemented in the capital region in cooperation with anesthesiologists [20]; sedation quality was found to be high following the implementation phase of NAAP in an endoscopy suite [21]. Therefore common training practice standards for all methods of sedation used in endoscopy have been shown to be beneficial in improving clinical practice as well as structural quality.

European and national societies have already developed evidence-based and consensus-based guidelines for sedation and monitoring in gastrointestinal endoscopy that give a comprehensive outline of structural requirements, medication options, patient monitoring and discharge, and the role of endoscopy staff [10–16]. Anesthesiology and gastroenterology societies have both demanded special training for staff administering sedation of any type [13,17], and especially for NAAP [10,14–16].

The joint endorsement of the present Curriculum by medical and nursing endoscopy societies emphasizes that a multidisciplinary approach is the best response to current needs [13,15,16]. In the United States of America, a multisociety sedation curriculum for gastrointestinal endoscopy has recently been introduced [22].

The Curriculum presented here is based on the consensus of physicians (gastroenterologists, anesthesiologists) and nurses who have previously been involved in the development of European and national sedation guidelines for endoscopy sedation, national curricula for endoscopy sedation, and the organization of national and local courses for endoscopy sedation.

## 2. Aims of the European Curriculum

This European Curriculum is intended for teachers and institutions organizing sedation courses.

\* Both authors contributed equally.

It focuses on training in all types of sedation practices in gastrointestinal endoscopy. Its aims are:

- ▶ To set standards for the training of non-anesthesiologists, physicians and nurses, who are going to administer sedation during gastrointestinal endoscopy procedures
- ▶ To expand the specific knowledge, competence, and skills necessary for endoscopists and nursing staff for endoscopy sedation, and management of its complications, in order to ensure patient comfort and safety
- ▶ To support individual endoscopy departments, national societies, and official bodies in developing local or national recommendations and curricula.

### 3. Methodology

The development of the current curriculum was based on the consensus of experts [23]. Six authors (A.R., B.W., J.M.D., P.H., P.V., U.B.) first met in Geneva (May 2011) and then in Bochum (July 2012). They agreed on the methodology to be applied and on a set of preliminary salient points to write a preliminary draft. Subsequently, all authors were invited to take part in the elaboration of the current Position Statement. They considered the soundness and applicability of the draft statements by means of an online session for voting and comments [24]. After integration of comments, the final draft was submitted to voting and participants were asked if they agreed or disagreed with each statement. The voting process with all contributions regarding content as well as voting results and evaluation of the consensus size were documented (strong consensus was defined as  $\geq 95\%$  agreement, consensus as  $> 75\%$  agreement, majority agreement as agreement within the range 51% to 75% inclusive, and no consensus as  $\leq 50\%$  agreement of participants). Strong consensus was achieved for every single item. All the authors approved the final version of the manuscript.

The Curriculum is based on national guidelines and curricula for training in sedation and management of its complications [10, 13, 18, 20], as well as the ESGE–ESGENA–ESA guideline for NAAP sedation in gastrointestinal endoscopy [15, 16], as the recommendations and principles presented here apply to all sedation practices for gastrointestinal endoscopy.

### 4. Target group

This Curriculum is intended for the following staff working in gastrointestinal endoscopy:

- ▶ Non-anesthesiologist physicians practicing gastrointestinal endoscopy
- ▶ Nurses and other allied professionals who are (according to national law) involved in sedation for gastrointestinal endoscopy including postinterventional care under the supervision of a physician practicing gastrointestinal endoscopy

According to recent guidelines, it is recommended that patients be continuously monitored by an independent person dedicated to PSA [11, 13, 15, 16].

### 5. Course duration and structure

#### 5.1. The course duration

The course duration should be as follows:

- ▶ A 3-day introductory course
- ▶ A minimum of 2 weeks of clinical training in the student's own clinical setting or a clinical setting that fulfils the training requirements.

#### 5.2. Course structure

▶ **The 3-day introductory course** combines theory and practice, with a focus on practical training. Therefore at least half of the time should be spent in practical training sessions. Practical training needs to be performed in small groups (from 4 to a maximum of 8 persons). Each section is followed by a formal test to document cognitive or skills competence.

In most European countries, basic and advanced life support skills have to be updated periodically, therefore competency in life support (e.g., basic life support [BLS] or advanced cardiac life support [ACLS], according to national law) is a prerequisite for anyone undertaking training in sedation for gastrointestinal endoscopy. The introductory course will also include a refresher in these techniques.

▶ **The clinical training** consists of a learning phase of at least 2 weeks with a mentor and with individual assessment of competencies (see Learning outcomes in Appendix 1). Summative assessment should be performed independently of one another by at least three independent supervisors (to ensure that each supervisor bears individual responsibility for the capability of the candidate), after a minimum of 30 student-documented cases (including diagnostic and therapeutic procedures), or more if trustworthy professional performance has not been achieved.

### 6. Teaching staff

The course organizers (a team of endoscopists, anesthesiologists, and nurses) and the additional teaching staff for the course should be competent in their areas of teaching, both in theory and in practice.

Suggested teachers are:

- ▶ A team of endoscopists and anesthesiologists
- ▶ Anesthesiology nurses in countries where this specialty exists, and/or
- ▶ Endoscopy nurses (qualified in endoscopy sedation in countries where this specialty exists)
- ▶ A lawyer or legal adviser to cover legal and professional issues (e.g., delegation and its implications)
- ▶ Other personnel as deemed relevant by the course management team
- ▶ Clinical mentor(s)/assessor(s) in the student's own department.

For courses which also include training in NAAP, the trainer responsible for bedside training and competence assessment should be a physician with previous experience of  $> 300$  cases of propofol sedation [15, 16].

### 7. Course content

The course integrates theory with practice and covers the following areas:

- ▶ Relevant anatomy and physiology of the heart and respiratory tract, including definitions of hypoxemia, hypocapnia and

hypercapnia, and their relationship to the risk profile of the individual patient.

- ▶ Basic pharmacology, pharmacokinetics, indications and contraindications of drugs commonly used for endoscopy sedation and pain control (e.g. benzodiazepines and opioids as well as their antagonists, and propofol, ketamine, nitrous oxide, and oxygen)
- ▶ Different sedation methods, including possibilities and limitations, possible side effects, prevention and management of complications
- ▶ Selection of patients appropriate for administration of sedation by non-anesthesiologists, including the use of health care questionnaires to help in patient selection
- ▶ Equipment and staff requirements necessary to ensure patient safety before, during, and after endoscopic interventions
- ▶ The use of different scores to assess patient risk status (e.g., American Society of Anesthesiologists [ASA] classification, risk score to predict difficult mask ventilation), and the relationship amongst patient risk status, foreseen sedation, and anticipated difficulty of the endoscopic procedure
- ▶ Patient preparation and surveillance, including safe positioning, intravenous access, monitoring, and oxygen administration
- ▶ Stages of sedation
- ▶ Management of sedation complications
- ▶ Documentation of sedation (e.g., assessment at regular intervals of oxygen saturation, heart rate, and blood pressure), drugs used (name, dosage), administration of intravenous fluids (type, quantity) and oxygen (flow rate), sedation-associated complications and their management, and fulfillment of discharge criteria
- ▶ Discharge criteria and patient instructions following gastrointestinal endoscopy under sedation
- ▶ National laws and guidelines, European and institutional guidelines and standards.

The teaching methods for achieving competency will be chosen by the course management team and the individual teachers, in line with national practice. Part of the practical training during the introductory course should preferably use full-scale patient simulators and deal with:

- ▶ Different sedation methods including dosing and drug effects in different types of patients
- ▶ Management of hypoxemic events, apnea, hypertension/hypotension, bradycardia/tachycardia, cardiac arrhythmias, communication in stressful situations (e.g., bleeding plus hypoxia)
- ▶ BLS/ACLS
- ▶ Debriefing in small groups of cases of sedation and endoscopy, including complications and their management.

A more detailed Teaching Curriculum is available (**Appendix 1**).

## 8. Technical equipment for courses



Full-scale patient simulators are recommended.

Simulation using patient simulators is a powerful training tool that is currently underutilized; patient simulators can easily be rented on a daily basis. Simulators have long been employed in pilots' flight training; they allow analysis of technical knowledge as well as of non-technical skills such as communication within the team and prevention of tunnel vision. "Tunnel vision" consists of the diagnosis of a problem with the exclusion of other

problems; this may be particularly important when endoscopy with sedation is performed and complications arise [25]. Debriefing, possibly enhanced by the review of videotaped simulations, may help participants to improve both technical and non-technical skills.

Originally developed in the field of anesthesiology [26], medical simulation exercises are now finding wider use in related fields such as intensive care medicine and emergency care. Studies of endoscopic sedation performed with simulators are rare. Kieslich et al. used this type of simulator to train staff in two different scenarios of gastrointestinal bleeding with significant blood loss and oversedation [27]. After debriefing on the first scenario, the authors were able to show a significant improvement in endoscopic performance and crisis management during the second scenario.

Using full-scale simulators for this course allows training on dosing and drug effects, and in management of different types of patients and their risk factors, of falls in oxygen saturation, blood pressure or heart rate, of cardiac arrhythmias, and of apnea [15, 16].

## 9. Assessment of theory and practice



Several methods can be used for the formative and summative assessments (see **Glossary**) of theory and practice (◉ **Table 1**).

### 9.1. Course assessment

A **summative assessment** of clinical practice is recommended in the form of direct observation of practice, debriefing/analytical reflection, in combination with a written examination at the end of the course (see also ◉ **Table 1**).

### 9.2. Clinical training

A **formative assessment** including review of the student's documentation of 30 sedation cases performed during the mentorship period is recommended, including cases observed, cases performed under supervision, and cases performed independently; the cases should comprise diagnostic and therapeutic interventional endoscopic procedures in different patients with different ASA scores. Documentation must include the type of endoscopic procedure, the ASA score, and adverse events and complications and their management. To enable future quality assurance audits (and for students to be accountable for their own practice as a regular professional duty), this type of case documentation should continue in the student's department after training has been completed, to ensure dependable professional practice.

In the student's clinical setting, the three independent supervisors take full responsibility for the final summative competency assessment of the student's ability to carry out sedation safely and competently.

### 9.3. Certification

After all successful assessments the student will receive a certificate awarded by ESGENA – ESGE. (This would also allow estimation of the number in Europe of those trained in sedation for gastrointestinal endoscopy).

**Table 1** Methods available for the assessment of the theoretical and practical parts of endoscopy sedation courses.

Assessment methods	Assessment of:		Assessment of:	
	Groups	Individuals	Theory (oral or written)	Practice
Standardized cases	X	X	X	X
Direct observation of practice	X	X		X
Oral examination		X	X	
Diary of practice with or without reflective practice or self-assessment		X	X	X
Practical examination	X	X		X
Production of patient information (sheets and booklets)		X	X	
Quiz	X	X	X	
Web-based examinations		X	X	
Statement of competence from authorized persons		X		X
Written examination (e.g., multiple-choice questionnaire, case study)	X	X	X	

## 10. Evaluation of courses

At the end of each course, students and teachers should evaluate the course delivered with regard to:

- ▶ Content relevance to the needs of individual students and their endoscopy departments
- ▶ Quality of course delivery
- ▶ Quality of learning environment
- ▶ Teacher and mentor support
- ▶ Clinical service provider support.

Individual countries may also want to evaluate the impact of nationally accepted courses on:

- ▶ Patient outcomes (complications, re-admissions, deaths)
- ▶ Structural improvements in endoscopy departments
- ▶ Staff satisfaction with their extended role
- ▶ Cost-effectiveness.

## 11. Accreditation of courses

The course organizers (a team of endoscopists, anesthesiologists, and nurses) should seek official recognition by national societies and/or official bodies.

## 12. Implementation of courses

As described above, the legal environment and consequently sedation management varies amongst European countries. This European curriculum can be a guidance to development or updating of a national curriculum:

- ▶ If a country has no available national/local course for sedation management in gastrointestinal endoscopy, national teams should be established to plan, implement and monitor courses.
- ▶ If courses have already been established, national or local teams should evaluate the existing courses in the light of this European curriculum.

Monitoring teams should be formed as multidisciplinary working groups of experts, educators, and representatives of relevant official bodies. They should include:

- ▶ Gastroenterologists/gastrointestinal endoscopists
- ▶ Anesthesiologists
- ▶ Endoscopy and/or anesthesiology nurses

- ▶ Lawyers/legal advisers
- ▶ Educators, if teams are created in an education facility (e.g., university, independent institutes of higher education)
- ▶ Healthcare providers and individual employees who have the responsibility to ensure regular updates of knowledge and skills.

## 13. Review date

5 years from publication date.

## 14. Glossary

**Summative assessment** is characterized as assessment of learning. It is done at the end of the learning process to determine and document the level of understanding that the student has achieved. It includes a mark or grade against an expected standard.

**Formative assessment** is assessment for learning. Formative assessment is an ongoing process during the whole unit of study to determine a student's knowledge and skills, identifying learning gaps as well as progress during the learning process.

## Legal disclaimer

ESGE Guidelines and Position Statements represent a consensus of best practice based on the available evidence at the time of preparation. They might 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 with these recommendations. ESGE Guidelines and Position Statements are intended to be an educational device for providing 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.

## Appendix 1: Teaching Curriculum



### A. Aims

The aims of the Teaching Curriculum are to:

- ▶ Prepare the student for safe sedation practice, including patient assessment, identification of risk factors, pre-, intra- and post-procedural patient care, administration of drugs, recognition and management of complications, and appropriate resuscitation
- ▶ Facilitate appropriate communications with patients and carers (e.g., regarding consent and discharge), and with other professionals as relevant
- ▶ Facilitate correct documentation in line with national laws and regulations
- ▶ Enable the student to identify situations where help, for example, from an anesthesiologist, is needed
- ▶ Enable the student to recognize his or her limitations in knowledge and practice, and where appropriate, to seek additional training
- ▶ Prepare the student to identify and to comply with structural and staffing requirements for safe sedation.

### B. Course content

#### Pre-course reading

- ▶ National and European guidelines and relevant additional literature

#### Pharmacology

- ▶ Sedatives and rescue drugs used for endoscopy sedation, including pharmacologic principles, pharmacokinetics, dosing, application techniques, contraindications, side effects of individual and of combined drugs for sedation. The following drugs should be covered during the course:
  - ▶ Benzodiazepines and their antagonists
  - ▶ Opioids and their antagonists
  - ▶ Propofol
  - ▶ Ketamine
  - ▶ Nitrous oxide
  - ▶ Analgesics used in conjunction with sedation
  - ▶ Oxygen
  - ▶ Any other sedative or analgesic drugs introduced to endoscopic procedures subsequent to publication of this curriculum.

#### Structural and personnel requirements

- ▶ Equipment requirements for monitoring and resuscitation
- ▶ Number, qualifications, and responsibilities of staff involved.

#### Pre-endoscopy management

- ▶ Patient risk assessment including use of different scores (see [Tables 2, 3 and 4](#))
- ▶ Identification of risk situations that require the presence of an anesthesiologist
- ▶ Implementation of special informed consent for sedation according to national standards
- ▶ Patient preparation (informing and instructing the patient, patient positioning, standard monitoring)
- ▶ Preparation of drugs, including hygiene guidelines for drug preparation and syringe labeling

**Table 2** Pre-procedural risk assessment of possible cardiovascular and respiratory problems during endoscopy.

#### A detailed history should include information on the following:

1. Diseases of the cardiovascular and respiratory system, stridor, snoring, sleep apnea syndrome
2. Previous complications when sedatives/analgesics, or regional and general anesthesia were administered
3. Drug allergies, current medication, and possible drug interactions
4. Time point and type of food intake
5. Tobacco, alcohol, drug consumption

#### References

1. American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. *Anesthesiology* 2002; 96: 1004–117
2. Cohen LB, Delegge MH, Aisenberg J et al. AGA Institute review of endoscopic sedation. *Gastroenterology* 2007; 133: 675–701

**Table 3** American Society of Anesthesiologists (ASA) physical status classification.

ASA Physical Status 1	A normal healthy patient
ASA Physical Status 2	A patient with mild systemic disease
ASA Physical Status 3	A patient with severe systemic disease
ASA Physical Status 4	A patient with severe systemic disease that is a constant threat to life
ASA Physical Status 5	A moribund patient who is not expected to survive without the operation
ASA Physical Status 6	A declared brain-dead patient whose organs are being removed for donor purposes

#### Reference

American Society of Anesthesiologists. ASA Physical Status Classification System. Available at: <http://www.asahq.org/clinical/physicalstatus.htm>. Accessed: July 9 2012.

**Table 4** Independent risk factors for difficult mask ventilation.

#### The presence of two of the following risk factors indicates a high likelihood of difficult mask ventilation:

- Presence of beard
- Body mass index > 26 kg/m<sup>2</sup>
- Lack of teeth
- Age > 55 years
- History of snoring

#### Reference

Langeron O, Masso E, Huraux C et al. Prediction of difficult mask ventilation. *Anesthesiology* 2000; 92: 1229–1236

### Peri-endoscopy management

- ▶ Sedation management according to patient risks and type of procedure
- ▶ Evaluation of sedation stages (see [Tables 5 and 6](#))
- ▶ Different sedation concepts including dosing and application methods
- ▶ Hygiene guidelines for drug application and storage
- ▶ Patient care and monitoring/observation criteria.

### Complication management

- ▶ Cardiorespiratory insufficiencies, shock
- ▶ Need for advanced upper airway management (e.g., Wendel or Guedel tube; see ESGE guideline about NAAP). Techniques of life support (e.g., BLS, ACLS)
- ▶ Identification of risk situations that require the presence of an anesthesiologist.

**Table 5** Modified Richmond agitation – sedation score.

Grade	Term	Description
0	Alert and calm	
-1	Sleepy	Not completely alert, but at least awake phases (eyes open, eye contact) lasting at least 10 s when patient is addressed
-2	Mild sedation	Awake phase (eyes open, eye contact) lasting less than 10 s when patient is addressed
-3	Moderate sedation	Movement or eye opening when patient is addressed (but no eye contact)
-4	Deep sedation	No reaction when patient is addressed, but movement or eye opening when physically stimulated (shaking shoulder or rubbing sternum)
-5	No reaction	No reaction when addressing patient or with physical stimulation

**Reference**

Ely EW, Truman B, Shintani A et al. Monitoring sedation status over time in ICU patients: reliability and validity of the Richmond Agitation – Sedation Scale (RASS). *JAMA* 2003; 289: 2983 – 2991

**Post-endoscopy follow-up**

- ▶ Post-endoscopy assessment criteria (see ▶ **Table 7**)
- ▶ Identification of adverse events and complications requiring additional monitoring and treatment
- ▶ Management of post-interventional care and patient discharge.

**Documentation and quality assurance**

- ▶ Minimum data sets to be recorded
- ▶ Methods of data recording (e.g., paper, digital)
- ▶ Audits of personal practice (including dosage, use of reversal agents, complications and their management, patient outcomes/deaths/re-admissions, etc).

**Legal aspects**

- ▶ Informed consent for sedation
- ▶ Professional duties and legal aspects of patient care, supervision and discharge, and case documentation
- ▶ Delegation and transfer of responsibilities
- ▶ Organizational liability and negligence.

**C. Learning outcomes – competencies to be achieved**  
**Pre-procedure assessment**

After completing the course the participant should be able to:

- ▶ Demonstrate an understanding of the principles of informed consent according to national law
- ▶ Be able to inform patients appropriately about the sedation, possible side effects and alternatives as well as post interventional behavior, and give the patients the opportunity to ask questions
- ▶ Assess the patient’s health status and risks; clearly document the patient’s pre-procedure assessment by using standardized health care questionnaires, scores (see ▶ **Tables 2, 3 and 4**), and nurse-based or physician-based documentation, including:
  - ▶ current health status (e.g., ASA classification, pregnancy)
  - ▶ risk factors for sleep apnea
  - ▶ abnormal head and neck features
  - ▶ chronic obstructive pulmonary disease of stages 3 – 4
  - ▶ cardiac failure of stages 3 – 4
  - ▶ history of bronchial aspiration
  - ▶ trouble with previous anesthesia or sedation
  - ▶ allergies
  - ▶ current medication
  - ▶ tobacco, alcohol, and drug consumption
  - ▶ assessment of correct preparation (e.g., adequate duration of fasting before a procedure or adequate preparation for colonoscopy)
- ▶ Identify high risk situations that require the presence of an anesthesiologist. This includes:
  - ▶ high ASA grade (III – IV) and a difficult endoscopic intervention
  - ▶ presence of pathological or anatomical features associated with a higher risk of airway obstruction during the intervention (for example:
    - a history of stridor, snoring or sleep apnea
    - patients with dysmorphic facial features [e.g., trisomy 21] or oral abnormalities such as small opening [i.e., < 3 cm in an adult], high arched palate, macroglossia, tonsillar hypertrophy, or a nonvisible uvula
    - patients with neck abnormalities, such as obesity, trauma, tracheal deviation, or advanced rheumatoid arthritis
    - patients with jaw abnormalities such as micrognathia, retrognathia, trismus or significant malocclusion)
  - ▶ patients receiving significant amounts of chronic pain medication or who for other reasons may have a high tolerance to agents used during sedation and analgesia.

**Table 6** Stages of sedation: modified from the classification of the American Society of Anesthesiologists.

	Minimal sedation (anxiolysis)	Moderate sedation	Deep sedation	General anesthesia
Responsiveness	Adequate reaction to verbal commands	Somnolence, reaction to louder commands with additional tactile stimulation if needed	Somnolence, hard to wake, targeted reaction to repeated tactile stimulation or pain stimulation	Patient cannot be woken, not even in response to pain stimuli
Spontaneous breathing	Unaffected	Adequate	Respiratory function mildly restricted	Inadequate, orotracheal intubation or larynx mask necessary

**Reference**

Gross JB, Bailey PL, Connis RT et al.; American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. *Anesthesiology* 2002; 96:1004 – 1017

- ▶ Critically judge their own limitations concerning knowledge and skills in sedation in gastrointestinal endoscopy
- ▶ Prepare the patient according to the planned procedure (e.g., correct positioning)
- ▶ Prepare the appropriate standard monitoring equipment (pulse oximetry and noninvasive blood pressure measurement for all patients undergoing sedation, electrocardiography [ECG] for patients with a history of cardiac and/or pulmonary disease)
- ▶ Prepare equipment for airway management (different tubes such as Guedel and laryngeal tubes, mask) and resuscitation equipment
- ▶ Prepare drugs according to the relevant guidelines, for health and safety as well as for hygiene.

### Intraprocedural sedation management and patient care

After completing the course the participant should be able to:

- ▶ Demonstrate understanding of the relevant anatomy and physiology of the heart and respiratory tract
- ▶ Demonstrate understanding of the basics of pharmacology and pharmacokinetics of the following drugs, including different sedation concepts, their possibilities and limitations, possible side effects, and prevention and treatment of complications:
  - ▶ Benzodiazepines and their antagonists
  - ▶ Opioids and their antagonists
  - ▶ Propofol
  - ▶ Oxygen
- ▶ Plan, perform and state reasons for individually adapted nursing and medical actions performed during the individual procedure
- ▶ Use the appropriate equipment for patient monitoring, including:
  - ▶ continuous pulse oximetry and automated noninvasive blood pressure measurement at baseline and then at 3–5-minute intervals
  - ▶ ECG for patients with a history of cardiac and/or pulmonary disease
- ▶ Assess patient status by using standardized methods and scores (see ◉ **Tables 5 and 6**), including:
  - ▶ cardiorespiratory activity
  - ▶ sedation level
  - ▶ pain (e.g., visual analogue scale from 0 to 10 with 0 equivalent to no pain)
- ▶ Use standardized medical and nursing protocols for documenting:
  - ▶ vital signs
  - ▶ sedation level (see examples of scores in ◉ **Table 5 and 6**)
  - ▶ pain level
  - ▶ changes in the patient's health status
  - ▶ adverse events and complications
  - ▶ related adequate patient care and medical action
- ▶ Administer sedation and rescue drugs taking into the account the pharmacokinetics, the patient's individual risk assessment, and the endoscopic procedure
- ▶ Apply health and safety guidelines (e.g., safe positioning, safe injection practices)
- ▶ Apply hygiene-relevant guidelines for drug application and storage.

### Complication management

After completing the course the participant should be able to:

- ▶ Demonstrate understanding of definitions of adverse events and complication (e.g., hypoxia, apnea, shock) and should be able to link this to the risk profile of the individual patient
- ▶ Identify conditions associated with increased risks of bronchial aspiration (e.g., acute upper gastrointestinal bleeding, delayed gastric emptying) and to initiate relevant precautionary maneuvers and treatment
- ▶ Identify clinical and technical signs of cardiorespiratory insufficiency and allergic reactions (e.g., airway obstruction, hypoxemia, hypotonia, apnea, laryngospasm) and to initiate relevant precautionary maneuvers and treatment
- ▶ Identify the need for simple and advanced airway management during the intra- and post-interventional phase (e.g., chin lift, Wendel or Guedel tube) and to initiate relevant treatment
- ▶ Support, perform and/or organize techniques of life support according to professional skills and responsibilities (e.g., BLS, ACLS)
- ▶ Identify intra- and post-interventional risk situations that require the presence of an anesthesiologist.

### Post-interventional monitoring and care

After completing the course, the participant should be able to:

- ▶ Assess patient status with regard to cardiorespiratory activity, pain, and sedation level, by using standardized methods and scores (see **Appendix 2**)
- ▶ Identify adverse events and complications requiring additional monitoring and treatment and initiate relevant precautionary maneuvers and treatment
- ▶ Use standardized medical and nursing protocols for documenting:
  - ▶ vital signs
  - ▶ sedation level (◉ **Tables 5 and 6**)
  - ▶ pain level (e.g., visual analogue scale from 0 to 10 with 0 equivalent to no pain)
  - ▶ changes in patient health status
  - ▶ adverse events and complications
  - ▶ related adequate patient care and medical action
  - ▶ home discharge (◉ **Table 7**)

### Legal issues

After completing the course the participant should be able to demonstrate understanding of

- ▶ National law, guidelines and local standards
- ▶ His/her responsibilities and limitations according to the job description and national and local regulations concerning delegation.

### Appendix 2: Clinical assessment scores



The following scores should be used in clinical assessment:

1. Pre-procedure risk assessment of possible cardiovascular and respiratory problems during endoscopy (◉ **Table 2**)
2. ASA physical status classification (◉ **Table 3**)
3. Independent risk factors for difficult mask ventilation (◉ **Table 4**)
4. Modified Richmond agitation – sedation score (◉ **Table 5**)
5. Stages of sedation – modified from the classification by the American Society of Anesthesiologists (◉ **Table 6**)
6. Minimal criteria for patient discharge after sedated endoscopy (◉ **Table 7**)

**Table 7** Minimal criteria for patient discharge after sedated endoscopy. (Adapted from Ead et al. *J Perianesth Nurs* 2006; 21: 259–267)

- Stable vital signs for at least 1 hour
- Alert and oriented to time, place, and person (infants and patients whose mental status was initially abnormal should have returned to their baseline status)
- No excessive pain, bleeding, or nausea
- Ability to dress and walk with assistance
- Discharged home with a responsible adult who will remain with the patient overnight to report any post-procedure complications
- Written and verbal instructions outlining diet, activity, medications, follow-up appointments, and a phone number to be called in case of emergency
- A contact person, and circumstances that warrant seeking the assistance of a healthcare professional clearly outlined
- Tolerant of oral fluids not mandatory, unless specified by physician (e.g., patient is diabetic, frail, and/or elderly; not able to tolerate an extended period of NPO status)

NPO, nil per os (nothing by mouth).

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