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Sedation in digestive endoscopy: the Athens international position statements

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SUMMARY

Background
Guidelines and practice standards for sedation in endoscopy have been developed by various national professional societies. No attempt has been made to assess consensus among internationally recognized experts in this field.

Aim
To identify areas of consensus and dissent among international experts on a broad range of issues pertaining to the practice of sedation in digestive endoscopy.

Methods
Thirty-two position statements were reviewed during a 1 ½-day meeting. Thirty-two individuals from 12 countries and four continents, representing the fields of gastroenterology, anaesthesiology and medical jurisprudence heard evidence-based presentations on each statement. Level of agreement among the experts for each statement was determined by an open poll.

Results
The principle recommendations included the following: (i) sedation improves patient tolerance and compliance for endoscopy, (ii) whenever possible, patients undergoing endoscopy should be offered the option of having the procedure either with or without sedation, (iii) monitoring of vital signs as well as the levels of consciousness and pain/discomfort should be performed routinely during endoscopy, and (iv) endoscopists and nurses with appropriate training can safely and effectively administer propofol to low-risk patients undergoing endoscopic procedures.

Conclusions
While the standards of practice vary from country to country, there was broad agreement among participants regarding most issues pertaining to sedation during endoscopy.

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INTRODUCTION

Sedation and analgesia comprise an important element of many endoscopic examinations, improving the quality of examination and contributing to the willingness of patients to undergo gastrointestinal procedures. Worldwide, patient attitudes and expectations are changing the way that endoscopists view sedation practice. Intravenous combinations of a sedative and analgesic have been used in many parts of the world for years, and have generally been administered by an endoscopist or nurse assistant. Recently, concerns have been expressed that sedative use may itself cause complications and (rarely) death. This issue has become more controversial with the introduction of propofol, a short-acting hypnotic agent, which many endoscopists and patients find superior to traditional sedation, but which, in some jurisdictions, can be administered only by a licensed anaesthetist. This document is intended to provide a worldwide perspective on the practice of sedation during digestive endoscopy.

The content of this international position statement represents a synthesis of evidence-based scientific literature, expert opinion, panel commentary and consensus view. The statements are intended to assist clinicians in decision making in order to optimize the safety and effectiveness of sedation. The statements and accompanying discussion are not intended as standards, guidelines, or absolute requirements. The panel acknowledges that standards of endoscopy and sedation vary widely among countries, and that application of these practice recommendations will necessarily vary in extent within different countries and regions. All known national and international statements pertaining to sedation practice and digestive endoscopy were reviewed and consulted in the preparation of this publication.

The World Organization of Digestive Endoscopy (OMED), the Hellenic Society of Gastroenterology (HSG), and European Society of Gastrointestinal Endoscopy (ESGE) decided jointly to hold an international workshop in order to produce a position statement on the indications for sedation in endoscopy, safe administration, patient monitoring and training of personnel involved with its use.

The workshop took place in Athens on 18–19 September 2009. Funding for the meeting was provided by the three societies and the United European Gastroenterology Federation (UEGF), without direct sponsorship from the biomedical industry that did not take part either in the meeting itself or in the preparation of this report. The meeting was endorsed by the American Society for Gastrointestinal Endoscopy (ASGE).

METHODS

Organization of meeting

A series of 32 position statements pertaining to sedation in digestive endoscopy were prepared by an eight-member panel that was selected by the meeting's organizers, Drs Anthony Axon and Spiros Ladas. The statements were organized into seven sections: Standards of Sedation; Basic Principles of Sedation; Assessment and Monitoring of the Patient; Avoiding and Managing Complications of Sedation; The Use of Propofol by Gastroenterologists; Training for Sedation in Gastrointestinal Endoscopy; and Future Directions in Sedation for Digestive Endoscopy. The international panel consisted of 32 individuals from 12 countries and four continents and included experts from the fields of gastroenterology, anaesthesiology and medical jurisprudence. A list of the panel participants is provided in the Appendix.

In preparation for this meeting, a section chairperson and three to five delegates were assigned to each section. For each statement, one individual within a section was assigned primary responsibility for performing a survey of the literature and the preparation of a document relevant to that statement. Additionally, six junior faculty members were selected to assist with literature review and the distribution of bibliography to the faculty.

The statements were presented and related discussions held during a 1 ½-day meeting in Athens on 18–19 September 2009. During the first day, each statement was presented to all attendees followed by a review of the evidence and personal opinion. Each statement was subsequently discussed amongst the group and modification to the statement made when agreed upon by a majority of the delegates. On the following day, the level of agreement for each statement was determined by an open poll. Delegates were requested to indicate their position for each statement by voting to 'agree', 'disagree' or 'abstain'.

Preparation of document

Following completion of the meeting, a writing committee headed by Dr Lawrence B. Cohen was tasked with preparing a manuscript for publication. Each statement was assigned to one or more delegates who were requested to prepare a commentary that included supporting evidence, divergent views (when appropriate) and concluding comments. The statements and commentaries were subsequently reviewed and modified by the writing committee and then were distributed to the scientific committee members for their review and

comment. The final draft of the manuscript incorporating comments and suggestions was prepared and subsequently approved. The meaning of each statement can be understood only in the context of the accompanying commentary, and should not be read or presented otherwise.

Definitions

The panel defined sedation as a drug-induced depression of a patient's level of consciousness. Sedation may be further qualified as minimal, moderate, deep or general anaesthesia. Throughout this manuscript, the term sedation is used interchangeably with phrase sedation and analgesia. The term monitored anaesthesia care (MAC) refers to instances in which an anaesthesia provider has been asked to administer drug(s) that is (are) intended to provide sedation, anxiolysis, amnesia, and/or analgesia to a patient undergoing a planned procedure. The target level of sedation is generally moderate or deep, rather than general anaesthesia, and most patients receiving MAC will not require ventilatory intervention. Anaesthesia professional refers to either an anaesthetist (a physician) or nurse anaesthetist (or certified registered nurse anaesthetist).

POSITION STATEMENTS

Standards of Sedation

Statement #1. *Topical anaesthesia of the oropharynx is helpful when performing oesophagogastroduodensocopy (OGD) although its use is associated with a small risk of anaphylaxis and pulmonary aspiration.* Vote: Agree 26 (90%), Disagree 3 (10%), Abstain 0. Studies have shown that topical anaesthesia of the oropharynx is beneficial in unsedated patients undergoing OGD.[1–3] Its value in sedated patients has been more difficult to demonstrate, however. A recent meta-analysis indicated that it does improve patient tolerance, as assessed by both patient and examiner, during OGD in sedated patients.[4]

Local anaesthetic agents are rapidly absorbed following topical administration within the oropharynx.[5] Caution should be exercised not to exceed the recommended dosage of these agents, and dose reduction is necessary in children. Lidocaine, the most commonly used agent for topical anaesthesia, may produce hypotension, bradycardia and cardiac arrest.[6] The use of benzocaine should be avoided because of the risk of methaemaglobinaemia. There are rare case reports of anaphylactic reactions induced by local anaesthetics, but the major concerns originally expressed no longer appear justified. There is a small but definite risk of aspiration following topical pharyngeal anaesthesia that may lead to post procedure pneumonia and therefore its use in the elderly and infirm is to be discouraged and patients should be warned not to take anything by mouth until the anaesthetic has worn off.[5, 7]

Statement #2. *Un-sedated OGD and colonoscopy are feasible in selected patients, but this requires commitment on the part of both the patient and the provider.* Vote: Agree 29 (100%).

It is generally accepted that sedation improves patient tolerance and compliance for GI endoscopy.[8] Sedation also increases the cost of the procedure and is responsible for nearly 50% of endoscopic complications.[9, 10] The decision to use sedation is influenced by socio-cultural differences between countries, patient expectation, and in some instances, economic considerations. Unsedated OGD is better tolerated by elderly males and may be performed in selected patients.[11–13] Factors that predict a willingness to undergo unsedated colonoscopy include male gender, older age, higher level of education and the absence of abdominal pain.

Sedation use during OGD varies enormously from one country to another. In 2006, a European survey of 29 countries indicated that in roughly half of the countries represented, fewer than 25% patients received sedation for OGD.[14] There is wide variation in practice, however, since sedation was used for more than 75% of cases in several of the countries surveyed. In the United States and Australia, nearly all OGDs are performed with sedation.[15]

Similar variations in the practice of sedation have been observed for colonoscopy. In 2006, a study from 14 Norwegian centres reported a mean sedation rate of 37% (range 6–97%).[16, 17] A recently published study from 11 European countries observed that sedation was used for a majority of patients in 9 of the 11 countries surveyed.[16, 17] Deep sedation was preferred in several countries and unsedated colonoscopy was the favoured strategy within two countries.[17] More than 98% of colonoscopies in the United States, Canada and Australia involve the use of sedation.

Statement #3. *Patients undergoing OGD or colonoscopy should be offered the choice of sedation or no sedation.* Vote: Agree 28 (97%), Disagree 0, Abstain 1 (3%).

The option of undergoing OGD or colonoscopy without sedation should be offered to all patients. This information should be transmitted to the patient prior to the time of the endoscopy, but does not necessarily require involvement of the endoscopist. During the informed

consent process, patients should again be informed of the choice of having an endoscopy with or without sedation. The information provided at this time should include a balanced discussion of the benefits and risks of sedated and unsedated endoscopy.[9, 18, 19] Patients should be reassured that appropriate measures have been taken to prevent a sedation-related complication.

Another option is the use of 'on-demand' sedation. This enables a patient who begins an examination without sedation to later receive medication in the event that they are unable to tolerate an unsedated procedure. This approach should be considered for patients who are uncertain about undergoing an unsedated endoscopy.[13, 20, 21]

Statement #4. *Sedation is the standard of care during diagnostic and therapeutic endoscopic procedures in many areas of the world.* Vote: Agree 28 (97%), Disagree 0, Abstain 1 (3%).

The panel members agreed nearly universally that sedation and analgesia constitute the standard of care during diagnostic and therapeutic endoscopic gastrointestinal procedures in many areas of the world. Nonetheless, panel members agreed that unsedated endoscopy is feasible in selected patients and requires commitment by the patient and the provider.

National and international surveys of endoscopists indicate that the use of sedation worldwide is increasing during routine endoscopic procedures.[14, 15, 22–27] The use of sedation, often deep sedation, is nearly universal during advanced diagnostic and therapeutic endoscopic procedures, including endoscopic retrograde cholangiopancreatography (ERCP), endoscopic ultrasound, and submucosal endoscopic dissection.

Statement #5. *The presence of an anaesthesia professional for sedation of low-risk individuals (ASA 1 or 2) undergoing routine endoscopy has not been demonstrated to improve endoscopic outcomes.* Vote: Agree 28 (88%), Disagree 2 (6%), Abstain 2 (6%)

No published studies have prospectively compared endoscopic outcomes with monitored anaesthesia care vs. endoscopist-directed sedation. On the basis of large database analyses and smaller, controlled trials examining endoscopic outcomes with various methods of sedation, there is no evidence in the literature that either patient safety or other endoscopic outcomes are improved with monitored anaesthesia care compared with endoscopist-directed sedation.

The majority of low-risk patients undergoing routine OGD and colonoscopy can be sedated satisfactorily with conventional methods of sedation. A small proportion of patients will not be adequately sedated using a benzodiazepine and an opioid and, in such cases, involvement of an anaesthesia professional is reasonable.

Statement #6. *The need for consultation with an anaesthesiologist should be determined both by the status of the patient and the expected complexity of the procedure.* Vote: Agree 29 (100%).

Preprocedure consultation with anaesthesia professional is appropriate for patients who are at significantly increased risk of a sedation-related cardiopulmonary event. This includes all patients classified as American Society of Anaesthesiology (ASA) physical status IV and V and, in some instances, ASA III patients. In some circumstances, it is also advisable to request an anaesthesia consultation for patients having risk factors for difficult mask ventilation and/or difficult intubation. Individuals who are unable to communicate adequately or are likely to be uncooperative during an endoscopic procedure are likely to require deeper sedation and should therefore be evaluated by anaesthesia professional. Patients who are scheduled to undergo an endoscopic procedure that may be prolonged or unusually painful may also benefit from the assistance of an anaesthesia provider. All endoscopists should possess the ability to identify those individuals and procedures in whom anaesthesia assistance is appropriate.

Statement #7. *Sedation may improve the quality of an endoscopic examination.* Vote: Agree 30 (94%), Disagree 0, Abstain 2 (4%).

Several studies have examined the impact of sedation on the quality of an endoscopic examination. The available data indicate that the administration of sedation is associated with an increased rate of completed endoscopic procedures as well as higher adenoma detection rates during colonoscopy.

In a retrospective analysis of more than 230 000 outpatient colonoscopies, male gender, middle age, an indication of colorectal cancer screening, satisfactory bowel preparation and sedation/analgesia were associated with the completeness of colonoscopy.[28] The use of sedative/analgesic premedication halved the risk of an incomplete examination. Similar results were reported in a study from Italy, which reported higher caecal intubation rates with the administration of sedation.[27, 28] In another Italian study, consecutive colonoscopies were evaluated prospectively over a 2-week period in 278 unselected practice sites throughout the country.[25] Multivariate analysis showed that the strongest predictors of caecal intubation were the quality of bowel preparation and the use of sedation. More importantly, detection of

polyps partially depended on the quality of bowel cleansing and use of sedation.

For prolonged diagnostic and most therapeutic endoscopic procedures, sedation is generally required for successful performance and increased quality of the examination.[9, 26, 29]

Statement #8. *Understanding the concepts of the continuum of sedation and patient rescue are important for safe sedation practices.* Vote: Agree 32 (100%).

Four stages of sedation have been described. These stages range from minimal sedation (anxiolysis) to general anaesthesia.[30] Between these two extremes are moderate and deep sedation, defined by an ability to exhibit purposeful responsiveness to verbal and/or tactile and painful stimuli, respectively. The appropriate level of sedation for a given endoscopic procedure should be judged based on the procedure type, patient characteristics and the physical environment.[9, 26]

In most circumstances, OGD and colonoscopy can be performed successfully with moderate sedation. Deep sedation should be considered when performing more complex endoscopic procedures, such as ERCP, endoscopic ultrasound and endoscopic submucosal dissection. In addition, the assistance of an anaesthesia specialist should be considered in patients with a history of chronic substance abuse (including alcohol or drugs) and patients using neuropsychiatric medications.

As sedation occurs along a continuum, a patient targeted for one level of sedation may become more deeply sedated than that intended.[30] All sedated patients should have their level of consciousness determined periodically during the examination and recovery periods using a standardized sedation scale. Individuals administering sedation/analgesia should be trained to rescue a patient who has reached a level of sedation at least one level deeper than that intended.

Principles of sedation

Statement #9. *Preprocedural medical evaluation has been shown to reduce the rate of sedation-related adverse events. It must be completed prior to any endoscopic procedure intended to be performed under moderate or deep sedation.* Vote: Agree 32 (100%).

The preprocedure medical assessment of patients receiving moderate or deep sedation for an endoscopic procedure is intended to (i) evaluate the patient's risk of complications resulting from procedural sedation, (ii) identify patients requiring preprocedure testing or consultation with an anaesthesia professional, (iii) permit the individual administering sedation to select the appropriate target level of sedation and sedation/analgesia agents, (iv) obtain informed consent, (v) minimize patient anxiety and inform the patient about sedation plan and (vi) review postprocedure instructions. A focused history and physical examination are adequate for most patients, and laboratory testing is not necessary when moderate sedation is administered except under well-defined circumstances (e.g. diabetic patient, patient on oral anticoagulant). Testing may be required when sedation is provided by an anaesthesiologist. This recommendation is based on expert opinion and has been broadly accepted as the standard of care.[9, 26, 30–32]

Statement #10. *Informed consent is a process that must take place between physician and patient, prior to the procedure, and should include discussion of pertinent risks, benefits and alternatives.* Vote: Agree 32 (100%).

The concept of informed consent is the duty upon the clinician to provide a patient with sufficient information so as to enable that patient to exercise their right to determine whether or not to consent to a certain procedure.

What amounts to sufficient information is determined differently depending upon the jurisdiction. In the United Kingdom, the extent and detail of information required of a clinician are assessed having regard to a reasonable body of medical opinion.[33] More recently, the trend has been towards patient-centric (i.e. what a reasonable individual would want to be told) approach in jurisdictions such as Canada and the United States.[34, 35]

Whether or not the information provided is determined by clinical opinion or patient expectation, there was unanimous agreement among panel participants that process of consent should take place and should include a discussion of the pertinent risks, benefits and alternatives. This should include a discussion of the options of no sedation, moderate and deep sedation, where applicable.

Statement #11: *ASA I, II and many III patients can be safely sedated for endoscopy by a trained endoscopist/nurse team.* Vote: Agree: 32 (100%).

The risk of a sedation-related cardiopulmonary complication increases with higher ASA physical status classification.[36, 37] The risk for a cardiopulmonary event is comparable for ASA I and ASA II patients receiving non-propofol mediated sedation, while the risk of complication was increased for ASA III patients (OR 1.8; 95% CI: 1.6–2.0). This risk increased progressively for ASA class IV and class V patients. Similar findings were observed with propofol-mediated sedation, although the

odds ratio differed slightly. The risk of airway and ventilatory complications appears to be somewhat greater during OGD than during colonoscopy.[38]

There was unanimous agreement among the panel members that most ASA I, II and III patients were appropriate candidates for sedation by an endoscopist and nurse with appropriate training and experience. This statement is consistent with published position statements and practice guidelines from many national organizations of gastroenterology.[9, 26, 39–41]

Statement #12. *Communication between the endoscopist and the provider of anaesthesia must take place prior to and during procedures that involve the provider of anaesthesia.* Vote: Agree 22 (69%), Disagree 2 (6%), Abstain 8 (25%).

Gastrointestinal procedures vary significantly in their complexity and the degree of patient stimulation and pain that occur. Therefore, the optimal sedation or anaesthetic technique differs for various endoscopic procedures. Although not evidence-based, most of the experts believed that communication between the endoscopist and the provider of sedation/anaesthesia should take place both prior to and during the procedure, as the objective of sedation may change during the examination.[42, 43] The provider of anaesthesia and the physician performing the procedures must have clear expectations of the sedation, and must be in agreement regarding these expectations.[44] Deficiencies in teamwork were found in one survey to account for nearly 50% of anaesthesia-related deaths.[45]

Statement #13. *The guidelines for pre-operative fasting proposed by the American Society for Anesthesiology (ASA) are appropriate for patients undergoing endoscopy.* Vote: Agree 28 (88%), Disagree 0, Abstain 4 (13%).

Pre-operative fasting is intended to minimize the risk of pulmonary aspiration in the patient with a depressed level of consciousness and an absent or diminished airway protective mechanism. Fasting, by reducing the residual volume of food and/or fluid within the stomach, is thought to reduce the risk of regurgitation and aspiration of gastric contents during a procedure. The gastric residual volume is reduced to approximately 20 mL following a 2 h fast and is not reduced further by an additional 10 h of fasting.[46]

A variety of fasting recommendations are found within the literature, reflecting the fact that there are no clinical studies which have demonstrated a direct relationship between fasting time and the risk of pulmonary aspiration. The ASA guidelines indicate that patients should fast a minimum of 2 h for clear liquids and 6 h for light meal prior to sedation.[47] There is no evidence that patients denied oral fluids for more than 2 h benefit in terms of reduced aspiration risk. Most professional societies have endorsed the ASA recommendations.[9] These recommendations apply only to individuals who are considered to be at normal risk for aspiration. A more prolonged period of fasting should be considered in patients who are suspected or known to have oesophageal obstruction (functional or structural) or delayed gastric emptying.

Statement #14: *Sedatives and analgesics must be titrated based upon the condition of the patient, information from monitoring equipment and the needs of a procedure.* Voting: Agree 31 (97%), Disagree 1 (3%).

The drugs most commonly used worldwide for gastrointestinal endoscopy are the opioids and benzodiazepines. Propofol, frequently administered at a subhypnotic dosage, is becoming increasingly popular in many countries for procedural sedation. Irrespective of the agent(s) being administered, the cardinal principle for safe sedation is careful dose titration as the precise dosage required to achieve the desired level of sedation for an individual patient cannot be predicted in advance. This requires an understanding of the pharmacology (pharmacokinetics and pharmacodynamic properties) of all drugs being used. The initial bolus dosage should be low and subsequent doses should be determined based on the pharmacokinetic properties of the drug, the patient's condition and dose-response and the needs of the procedure.

Age, patient weight, drug-drug interactions, hepatic and renal dysfunction, and genetic polymorphism may affect the pharmacokinetic and/or pharmacodynamic properties of a sedative or analgesic, and appropriate dose reduction is indicated.[48] The determination of drug dosage in obese patients should be based on the lean body mass, rather than the total body weight, to avoid oversedation of the patient.[49] The synergistic interaction of drugs, especially between opioids and benzodiazepines, should be taken into account when selecting the dose of drug for administration.[50, 51]

Assessment and monitoring of the patient

Statement #15: *Monitoring of the patient's heart rate, arterial oxygen saturation, and blood pressure must be performed in patients receiving sedation.* Vote: Agree 18 (56%), Disagree 8 (25%), Abstained 6 (19%).

A majority of the panel participants supported the recommendation for routine monitoring of heart rate, blood pressure and oxygen saturation. This is consistent

with the practice guidelines published by the ASA.[30] This recommendation is based on expert opinion.

Pulse oximetry is the most important parameter and should be distinguished by an audible tone that is readily recognized. A delay of 30–60 s exists between real-time oxygen saturation and the digital display. Therefore, a thorough assessment of respiration includes patient observation, analysis of respiratory rate via impedance pneumography, and when appropriate, capnography. Individuals responsible for patient assessment and monitoring should understand the difference between measures of ventilation and measures of oxygenation, and should also recognize the influence of supplemental oxygen on those parameters.

Heart rate and blood pressure are also important parameters of haemodynamic stability, providing important feedback about the patient's response to sedation as well as to the endoscopic procedure. Titration of sedation based on the response of blood pressure is difficult, however, because blood pressure is monitored intermittently rather than continuously like respiratory rate, heart rate and oxygen saturation.

Statement #16. *Monitoring of the patient's level of consciousness throughout an examination is useful when assessing the effect of sedation and may improve patient outcome.* Vote: Agree = 32 (100%).

The risk of an unplanned cardiopulmonary event is directly related to the level of sedation. As the depth of sedation increases, so too does the likelihood that a patient will develop loss of the airway reflex, hypoventilation and/or apnea, or cardiovascular instability.[30] The assessment of a patient's level of consciousness is intended to avoid the untimely administration of additional sedation medication and to permit the early recognition of an oversedated patient. The recommendation for monitoring level of consciousness in a sedated patient is based on expert opinion.

Periodic assessment of the patient's level of sedation is recommended as the level of consciousness may vary during an examination. A number of scales have been developed to describe and quantify sedation.[52, 53] In nearly all instances, however, these tools were developed for assessing patient behaviour in the intensive care unit and their usefulness in the context of sedation during digestive endoscopy remains uncertain. The Observer's Assessment of Alertness/Sedation Scale (OAA/S) has been the most widely used instrument for the clinical assessment of patients undergoing endoscopy.[54] Assessment is based on a stimulus-response relationship. An OAA/S level of 2, 3 or 4 indicates purposeful responsiveness to verbal or light tactile stimulus, corresponding to moderate sedation. Additional research is warranted to demonstrate the reliability and validity of the OAA/S in the setting of endoscopy.

Statement #17. *Administration of supplemental oxygen is recommended but may mask early recognition and treatment of ventilatory depression.* Vote: Agree 30 (94%), Disagree 2 (6%), Abstain 0.

The administration of supplemental oxygen results in hyperoxygenation and, in the event of hypoventilation or apnea, extends the time that a patient remains adequately oxygenated. It has become standard practice throughout many areas of the world to administer supplement oxygen during endoscopy to all patients receiving moderate sedation. This practice is endorsed by many, although not all, professional societies.[9, 26, 30, 40]

There is no evidence in the literature that routine administration of supplemental oxygen reduces the incidence of significant cardiopulmonary complications in patients being monitored with pulse oximetry. The findings of several studies demonstrated that routine administration of supplemental oxygen delayed the recognition of hypoxemia and apnea. A retrospective analysis of a large nationwide endoscopic database indicated that the routine use of supplemental oxygen during moderate sedation was associated with an increased rate of cardiopulmonary events.[36]

Equipment to administer supplemental oxygen should be available wherever sedation is being delivered. The routine administration of supplemental oxygen is recommended for elderly patients and those with significant comorbid disease (ASA IV and V) undergoing endoscopy with sedation.[9] The decision regarding whether to use supplemental oxygen routinely in average risk patients undergoing elective endoscopy with moderate sedation should be based on local institutional policy and prevailing standards. It is the consensus of this panel that supplemental oxygen should be administered routinely to patients receiving deep sedation.

Statement #18. *Capnography is a more precise measure of ventilation than observation of the patient's chest wall. Its use during endoscopy requires further evaluation.* Vote: Agree 32 (100%).

Capnography is a non-invasive technique for the measurement and graphic display of carbon dioxide in expired gases. Capnometers are configured either mainstream or sidestream. Mainstream capnography uses an in-line infrared carbon dioxide sensor placed between the endotracheal tube and the breathing circuit, which provides an accurate, real-time measure of exhaled

carbon dioxide. Sidestream capnography utilizes a remote monitor and sensor that measures the carbon dioxide of gas aspirated from a modified nasal cannula. The gas samples typically must travel a distance of one to two metres to reach the sensing apparatus, accounting for a short delay in the response time. The shape and trend of the carbon dioxide waveform, combined with the partial pressure of carbon dioxide recorded using a capnometer, provide important physiological data about a patient's ventilatory status.

The role of capnographic monitoring during endoscopy has been examined in several studies. Two randomized studies, one involving a paediatric population undergoing OGD or colonoscopy with standard sedation and another in adults having ERCP or endoscopic ultrasound, demonstrated that the use of capnography detected more episodes of disordered respiration and reduced the number of hypoxemic events compared with visual assessment and monitoring of standard physiological parameters.[55, 56] Several observational studies with capnographic monitoring during endoscopy have also been reported.[57–59] Currently, there is insufficient evidence to recommend routine capnographic monitoring for average-risk patients undergoing elective OGD and colonoscopy. Research is warranted to examine the utility of capnography in high-risk patients undergoing endoscopy as well as during prolonged endoscopic procedures and procedures performed under deep sedation.

Statement #19: *During sedation, in addition to the endoscopist, at least one qualified individual must be assigned to monitor the patient. This person can perform brief, interruptible tasks without leaving the room.* Vote: Agree 29 (91%), Disagree 2 (6%), Abstain 1 (3%).

Safe sedation requires appropriate patient monitoring. Measurement of a patient's physiological parameters is important, but not sufficient. Direct observation of a patient's ventilation and airway status by a trained individual may detect potential problems prior to any automated monitoring device. This has been emphasized in guidelines from both the anaesthesiology and gastroenterology groups which state that there should be a dedicated individual to monitor directly the patient's level of consciousness, ventilation and oxygenation status.[30] Most guidelines acknowledge that this person may perform '…tasks of short duration that may be interrupted' if the patient is moderately sedated.[9] If deep sedation is achieved, however, this person must direct full attention to observing and monitoring the patient. This statement is based on experts' opinions.

Statement #20: *Patients receiving sedation must be monitored during recovery.* Vote: Agree 30 (94%), Disagree 0, Abstain 2 (6%).

All patients receiving intravenous sedation require monitoring during recovery.[9, 30] This is deemed essential as the risk of a sedation-related complication during recovery is equal to or greater than that during the examination period itself. Monitoring and pre-defined discharge criteria should be developed and utilized within all endoscopy units to decrease the risk of an adverse event following the administration of either moderate or deep sedation.[60]

Patients should be observed in an appropriately staffed and equipped area until they are at or near baseline level of consciousness and preprocedure vital signs. Particular attention should be paid to oxygenation, which should be monitored periodically until patients are no longer at risk for hypoxemia. Ventilation and circulation should also be monitored at regular intervals until patients are suitable for discharge. The duration and frequency of monitoring should be individualized depending upon the level of sedation, the condition of the patient and the endoscopic intervention. At the time of discharge, the patient's level of consciousness, vital signs and physical capacities should be back to baseline level. All patients receiving sedation should be escorted from the endoscopy unit by a responsible adult.

Avoiding and managing the complications of sedation

Statement #21. *Benzodiazepine and opioid antagonists have not been demonstrated to produce meaningful savings in recovery time following sedation with standard agents. Their use is indicated when urgent reversal of an opioid or benzodiazepine is required.* Vote: Agree 31 (97%), Disagree 1 (3%), Abstain 0.

Pharmacological antagonists are available that reverse the effects of benzodiazepine and opioid agonists. These reversal agents have been used to reverse drug-induced side effects such as nausea, vomiting, excessive sedation and respiratory depression. Naloxone is a nonselective competitive antagonist that inhibits all pharmacologic effects of opioids. Its onset of action is 1–2 min and its half-life is 30–45 min. A dose of 0.2–0.4 mg is generally sufficient to antagonize the respiratory depressant effect of an opioid agonist. Serious complications including cardiac arrest, pulmonary oedema, seizures and cardiac arrhythmias have been reported in comatose patients due to opioid overdose treated with naloxone.[61] The possibility of cardiovascular instability and renarcotization should be anticipated when treating patients with

naloxone, and all patients receiving naloxone require cardiorespiratory monitoring for up to 2 h.[62] Flumazenil reverses the sedative effect of benzodiazepines by competitively blocking the GABA receptor. Similar to naloxone, its half-life is shorter than the agonist so that re-sedation may occur. A dose of 0.3–0.5 mg is generally sufficient to reverse the effects of benzodiazepine overdose. Flumazenil has resulted in reduced recovery time in several clinical trials, although this clinical benefit was believed to be outweighed by the additional cost and risk of complications.[63–65] The panel members believed that routine use of a reversal agent is not appropriate.

Statement #22. *Each endoscopy facility must be properly equipped to handle sedation-related emergencies where sedation is administered.* Vote: Agree: 30 (94%), Disagree 0, Abstained 2 (6%).

Emergency equipment to manage sedation-related emergencies should be immediately available wherever sedation is being administered.[9, 30] It is recommended that all equipment for emergency management be stored on a mobile cart for ease of transport within the endoscopy suite. A reliable source of oxygen and efficient suction must also be readily available. Emergency medications should include drugs that antagonize the pharmacological effects of opioids and benzodiazepines. Oral and/or nasal airways and an Ambu bag should be available. Equipment for advanced airway management such as laryngoscopes, endotracheal tubes and extraglottic airway devices may be appropriate elements of an emergency cart. A functional defibrillator should be immediately available whenever deep sedation is administered and when moderate sedation is provided to patients with cardiovascular disease.

The use of propofol by endoscopists

Statement #23. *Gastroenterologists and nurses with appropriate training for propofol sedation during endoscopic procedures may administer propofol safely and effectively.* Vote: Agree 31 (97%), Disagree 0, Abstain 1 (3%).

Worldwide, the published experience with gastroenterologist-directed propofol administration now exceeds 650 000 cases.[38] The overall mortality rate for EDP is approximately 1 per 158 000 cases, which compares favourably with mortality figures for standard sedation in digestive endoscopy using an opioid and benzodiazepine (1 per 10 000) and general anaesthesia (1 per 10–50 000).[36, 66] A meta-analysis of three endoscopic studies comparing sedation with midazolam plus a narcotic with propofol alone detected no significant difference in the incidence of bradycardia, hypotension or hypoxemia.[67] A second meta-analysis of 13 studies involving 1181 patients observed no significant difference in the rate of hypoxemia among patients receiving propofol, either alone or in combination with another agent, as compared with a narcotic and benzodiazepine (OR 0.74; 95% CI 0.45, 1.21).[68] Similarly, no difference was found in the need for airway intervention for hypoxemia or apnea in the two treatment groups.

Based on the published literature, the administration of propofol by gastroenterologists and nurses is appropriate for low and average-risk patients undergoing elective endoscopic procedures.[29] Physicians and nurses undertaking EDP should have appropriate training, which should include a didactic module on propofol administration, hands-on training in advanced airway management and one-on-one preceptorship. Whenever feasible, training programmes should be developed and conducted in conjunction with an anaesthesiologist.

Statement #24: *Recovery time and discharge time are shortened, and patient satisfaction after endoscopy is improved, with propofol compared to sedation with a benzodiazepine ± an opioid.* Vote: Agree 27 (84%), Disagree 4 (13%), Abstain 1 (3%).

Propofol sedation, whether administered by anaesthesia professional or an endoscopist, results in faster onset of sedation, reduced recovery time, and quicker discharge when compared with standard sedation using a benzodiazepine and/or opioid.[67–77] Most of data supporting this conclusion were derived from studies of patients undergoing colonoscopy and OGD, although similar findings have been reported for ERCP and endoscopic ultrasound.[70, 73]

Pooled data from OGD and colonoscopy studies found a high level of satisfaction among patients receiving propofol-mediated sedation. Patient satisfaction data for advanced procedures such as ERCP and endoscopic ultrasound are limited. A randomized study of patient undergoing endoscopic ultrasound observed greater satisfaction in the group receiving EDP sedation when compared with patients receiving a benzodiazepine and an opioid.[70] In contrast, a smaller randomized trial that enrolled patients undergoing either ERCP or endoscopic ultrasound found similar levels of patient satisfaction.[73]

Statement #25. *To date there is no demonstrated difference in endoscopic safety or efficacy with propofol compared to sedation with a benzodiazepine either alone or combined with an opioid.* Vote: Agree 28 (88%), Disagree 0, Abstain 4 (12%).

The safety of standard sedation using a benzodiazepine and an opioid compared with propofol has been examined in multiple studies. A meta-analysis found that propofol sedation was associated with a lower odds ratio of major cardiopulmonary complications during colonoscopy than a benzodiazepine and an opioid.[72] This finding is supported by two systematic reviews of the literature, which concluded that there was no difference in the rate of complications between standard sedation using a benzodiazepine and opioid compared with propofol.[67, 68]

A majority of experts believe that there is no convincing evidence that one method of sedation improves the quality of an endoscopic examination more than another. This statement applies to an average-risk patient undergoing a routine OGD or colonoscopy. The benefit of deep sedation during a prolonged diagnostic or an advanced therapeutic endoscopy might favour the use of propofol in such circumstances. Nonetheless, well-designed randomized, controlled studies are necessary to address this issue.

Training for sedation in digestive endoscopy

Statement #26. *A training program designed for individuals planning to administer sedation should incorporate didactic teaching, supervised patient care, and simulation experience for critical skill training and assessment. An anaesthesiologist should participate in program development and teaching.* Vote: Agree 29 (100%).

Guidelines on sedation practice by numerous professional gastroenterology societies endorse the need for specialized training in sedation. The necessary components of this training have been previously described.[9, 29, 30, 78] It should include didactic teaching about the physiology, pharmacokinetic and pharmacodynamic properties of all drugs used for sedation, adverse reactions of drugs, patient monitoring, recovery assessment and the assessment and management of sedation-related complications. Practical training should occur in a situation closely supervised by an experienced provider of sedation. The use of simulation technology has been demonstrated to enhance didactic and practical training for sedation.[79] Simulators strengthen airway management skills and can simulate emergency situations that can arise. The participants agreed that an expert in airway management (an anaesthesiologist) should participate in developing and implementing a training programme.

Statement #27. *Airway skill competency for practitioners using sedation must include (at a minimum) basic airway maneuvers, placement of oro-or nasopharyngeal airway, bag-mask ventilation and laryngeal mask airway placement.* Vote: Agree 26 (90%), Disagree 0, Abstain 3 (10%).

Airway skill competency may be broadly defined as an ability to identify and manage inadequate ventilation in patients. Failure to adequately manage the airway has been identified as a leading cause of adverse outcomes in patients undergoing endoscopy and sedation.

The essential skill sets required include an ability to perform a bedside screening assessment to predict difficult bag mask ventilation and/or tracheal intubation, an ability to recognize and distinguish upper airway obstruction from central hypoventilation or apnea and the skills to restore adequate gas exchange. For moderate sedation, the practitioner should be capable of placing an oral and/or nasal airway, and possess the knowledge and skill to perform bag mask ventilation successfully. When deep sedation is targeted, this individual should also be trained and skilled in the use of one or more extraglottic devices, such as the laryngeal mask airway. The acquisition and maintenance of these skills requires formal didactic training and hands-on workshops followed by re-certification at regular intervals. Competency should be formally assessed and documented.

Statement #28. *All physicians and nurses performing sedation must possess the skills necessary to rescue the patient from cardiopulmonary distress.*
Voting: Agree 27 (93%), Disagree 0, Abstain 2 (7%).

Considering the dynamic continuum of sedation and that the principal potential complications of sedation involve respiratory or cardiovascular depression, there was general consensus among the delegates that all health care practitioners involved in the provision of sedation, should be capable of rescuing the patient from cardiopulmonary distress. The discussion relating to this statement mainly revolved around the level of training required by personnel present in the room where sedation is being administered. Most delegates believed that all health care professionals who are involved in the provision of sedation must be able to provide basic life support, with the immediate availability (up to 5 min away) of a provider of advanced cardiac life support. During procedures involving the use of propofol sedation, an advanced cardiac life support provider must be present in the room where sedation is being delivered. This statement is supportive of similar statements made in guidelines and consensus reports published by other joint societies and institutions to date.[9, 26, 30, 78]

Statement #29. *Competency for sedation should be formally assessed and documented at the time of initial*

granting of privileges, monitored consistently through quality assurance programs, and reassessed and documented at regular intervals. Vote: Agree 28(97%), Disagree 0, Abstain 1 (3%).

While the literature on sedation and the guidelines of various societies all agree that specific training is required for competency in sedation, the guidelines do not specify how competency should be assessed and documented.[9, 26, 78] There are no data in the literature to guide us regarding the documentation of competency or its effect on patient outcomes.

All providers involved in sedation should have appropriate training and documentation of competency for their role in patient care. Competency should be achieved and documented as part of formal training in gastrointestinal endoscopy. This could be through a fellowship, residency or other formal training programme. The competency of a specific provider should be documented at the time when initial privileges are granted for sedation. Individual assessment is required. Continued competency in sedation should not be assumed, but should be regularly reassessed and documented as part of the renewal of privileges. The competency of an individual provider should also be assessed when there is a significant complication of sedation, or colleagues question the competency of the provider.

Training and documentation of competency should be uniform for all providers using sedation within an institution, irrespective of the practice location. A single institutional team consisting of experts in sedation and anaesthesia should determine the appropriate training, requirements for competency and assessment for competency. The required training should conform to existing guidelines for content and include both didactic and hands-on training. Direct observation of patient care is optimal.

Future directions in sedation in digestive endoscopy

Statement #30. *Although current methods of sedation are effective for the majority of patients undergoing endoscopy, techniques that enhance patient satisfaction, safety and recovery are desirable.* Vote: Agree 29 (100%).

An ideal agent for endoscopic sedation should possess sedative, analgesic and amnestic properties. Furthermore, its pharmacokinetic profile should be compatible with the planned endoscopic procedure. For routine OGD and colonoscopy, this would include a rapid onset of action (1–2 min), brief duration of effect (5–15 min), and quick recovery (15–30 min). In some instances, it may be desirable to have a drug possessing a slightly longer duration of effect. Alternatively, additional boluses of an ultrashort acting agent could be administered during a procedure, provided that its recovery profile was suitable. The agent should have minimal depressant effect on respiration or cardiovascular stability. The therapeutic window should be sufficiently wide to minimize the risk of inadvertent oversedation, and a reversal agent possessing an onset of action less than 1 minute should be available. Finally, it should have few interactions with other drugs. None of the drugs currently in development promise to provide all of the properties listed above.

Statement #31. *Infusion platforms that permit control of drug delivery by the patient are promising alternatives to current methods of sedation.* Vote: Agree 28 (97%), Disagree 0, Abstain 1 (3%).

Patient-controlled analgesia/sedation, which utilizes a computerized pump to deliver predetermined amounts of a sedative and/or opioid, and enables a patient to control the timing of drug delivery, offers the advantage of tailoring sedation to the unique sedation needs of each patient and procedure. Patient-controlled analgesia/sedation for endoscopy has proven to be reasonably safe and effective compared with standard sedation. When used with an ultra short-acting sedative such as propofol, the recovery profile and patient satisfaction compare favourably with standard sedation.[80–83]

Target-controlled infusion systems deliver sedative and/or analgesic medications based on pharmacological models utilizing a computer-controlled infusion pump. Unlike patient-controlled analgesia/sedation, target-controlled infusion is designed to maintain a steady state level of the infused drug. The system may be configured as a closed-loop system that is regulated by physiological feedback, or it may function as a simple open-loop system. In case series that involved the use of target-controlled infusion, the majority of subjects achieved adequate levels of sedation, although both over-sedation and under-sedation were observed. Target-controlled infusion systems have been approved in nearly every country of the world with one notable exception, United States.[84–86]

Computer-assisted personalized sedation is a novel delivery system, which integrates physiological monitoring, target-controlled propofol infusion and a patient-responsiveness monitor in a closed-loop system.[87] The system is designed to target moderate sedation. The device has demonstrated the capacity to sedate patients undergoing OGD and colonoscopy safely and effectively compared with standard sedation.[88, 89]

Most panel participants agreed that infusion platforms that control drug delivery for procedural sedation are

Table 1 | Comparison of the OMED/HSG/ESGE statements with other published guidelines UK, British Society of Gastroenterology (BSG) guidelines 2003; Spain, Spanish Society of Gastrointestinal Endoscopy (SEED) guidelines 2006; Austria, Austrian Society of Gastroenterology and Hepatology (ÖGGH) 2007; Germany, German Society for Digestive and Metabolic Diseases (DGVS) S3 guideline 2008; US, American Gastroenterological Association (AGA) guideline 2007

		Agreement with published national guidelines				
	OMED/HSG/ESGE statements	UK	Spain	Austria	Germany	US (AGA)
1.	Local anaesthetic spray is helpful when performing OGD, but carries a small risk of anaphylaxis and may predispose to aspiration	✔	-	-	-	-
2.	Unsedated OGD and colonoscopy are feasible in selected patients, but this requires commitment on the part of both the patient and the provider	✔	✔	✔	✔	✔
3.	Patients undergoing OGD or colonoscopy should be offered the choice of sedation or no sedation	-	✔	-	✔	✔
4.	Sedation ± analgesia is the standard of care during diagnostic and therapeutic endoscopic gastrointestinal procedures in many areas of the world	✔	✔	✔	✔	✔
5.	Consultation with an anaesthesiologist should be determined by both the status of the patient and the expected complexity of the procedure	✔	✔	✔	✔	✔
6.	Sedation may improve the quality of an endoscopic examination	✔	✔	✔	✔	✔
7.	Understanding the concepts of the continuum of sedation and patient rescue are important for safe sedation practices	✔	✔	✔	✔	✔
8.	Pre-procedure evaluation has been shown to reduce the rate of sedation-related adverse events; it must be performed prior to any endoscopic procedure intended to be performed under sedation	✔	✔	✔	✔	✔
9.	Informed consent is a process that must take place between physician and patient, prior to the procedure, and should include discussion of pertinent risks, benefits and alternatives	✔	✔	✔	✔	✔
10.	Most ASA I, II and III patients can be safely sedated for endoscopy by a trained endoscopist/nurse team	✔	✔	✔	✔	✔
11.	Communication between the endoscopist and the provider of anaesthesia must take place prior to and during procedures that involve the provider of anaesthesia	✔	✔	✔	✔	✔

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Table 1 | (Continued)

	OMED/HSG/ESGE statements	Agreement with published national guidelines				
		UK	Spain	Austria	Germany	US (AGA)
12.	The guidelines for pre-operative fasting proposed by the American Society for Anaesthesiology (ASA) are appropriate for patients undergoing endoscopy	-	-	-	-	-
13.	Sedatives and analgesics must be titrated based on the condition of the patient, information from monitoring equipment and needs of the procedure	✔	✔	✔	✔	✔
14.	Monitoring of the patient's heart rate, arterial oxygen saturation, and blood pressure must be performed in patients receiving sedation	✔	✔	✔	✔	✔
15.	Monitoring of the patient's level of consciousness throughout an examination is useful in assessing the level of sedation and may improve patient outcome	✔	✔	✔	✔	✔
16.	Administration of supplemental oxygen is recommended, but may mask early recognition and treatment of ventilatory depression	✔	✔	✔	✔	✔
17.	Capnography is a more precise measure of ventilation than observation of the patient's chest wall; its use during endoscopy requires further evaluation	-	✔	-	✔	✔
18.	Electrocardiographic monitoring must be considered when sedating patients with a history of clinically significant cardiac disease	✔	✔	✔	✔	✔
19.	During sedation, in addition to the endoscopist, at least one qualified individual must be assigned to monitor the patient. This person can perform brief, interruptible tasks without leaving the room	✔	✔	✔	✔	✔
20.	Patients receiving sedation must be monitored during recovery	✔	✔	✔	✔	✔
21.	Benzodiazepine and opioid antagonists have not been demonstrated to produce meaningful savings in recovery time following sedation with standard agents; their use is indicated when urgent reversal of an opioid or benzodiazepine is required	✔	✔	-	✔	✔
22.	Each endoscopy facility must be properly equipped to handle sedation-related emergencies where sedation is administered	✔	✔	✔	✔	✔

Table 1 | (Continued)

	OMED/HSG/ESGE statements	Agreement with published national guidelines				
		UK	Spain	Austria	Germany	US (AGA)
23.	Gastroenterologists and nurses with appropriate training for propofol sedation during endoscopic procedures may administer propofol safely and effectively	×	-	✔	✔	✔
24.	Recovery time and discharge time are shortened, and patient satisfaction after endoscopy is improved with propofol compared with sedation with a benzodiazepine ± an opioid	-	-	✔	✔	✔
25.	There is to date no demonstrated difference in endoscopic safety or efficacy with propofol sedation compared with sedation with a benzodiazepine ± an opioid	-	-	✔	✔	✔
26.	The presence of an anaesthesia provider for sedation of low-risk individuals (ASA 1 or 2) undergoing routine endoscopy has not been demonstrated to improve endoscopic outcomes	-	-	✔	-	✔
27.	A training programme designed for individuals planning to administer sedation should incorporate didactic teaching, supervised patient care and simulation experience for critical skill training and assessment. An anaesthesiologist should participate in programme development and teaching	✔	✔	✔	✔	✔
28.	Airway skill competency for practitioners using sedation must include (at a minimum) basic airway manoeuvres, placement of oro- or nasopharyngeal airway, bag-mask ventilation and laryngeal-mask airway placement	✔	✔	✔	✔	✔
29.	All physicians and nurses performing sedation must possess the skills necessary to rescue the patient from cardiopulmonary distress	✔	✔	✔	✔	✔
30.	Competency for sedation should be formally assessed and documented at the time of initial granting of privileges, monitored consistently through quality assurance programmes, and reassessed and documented at regular intervals	✔	-	-	✔	✔
31.	Although current methods of sedation are effective for the majority of patients undergoing endoscopy, techniques that enhance patient satisfaction, safety and recovery are desirable	-	-	-	-	✔

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Table 1 | (Continued)

	OMED/HSG/ESGE statements	Agreement with published national guidelines				
		UK	Spain	Austria	Germany	US (AGA)
32.	Infusion platforms that permit control of drug delivery by the patient are promising alternatives to current methods of sedation	-	-	-	-	✔
33.	New methods of sedation should be cost-effective when compared with existing sedation modalities	-	-	-	-	✔

✔, concordance of OMED/HSG/ESGE statement and National guideline.

-, no specific guidance given in National guideline.

promising alternatives to standard sedation. Not all patients or procedure types may be well-suited for use of a drug infusion system.

Statement #32. *New methods of sedation should be cost-effective when compared to existing sedation modalities.* Voting: Agree 27 (93%), Disagree 1 (3%), Abstain 1 (3%).

Standard methods of sedation using a benzodiazepine and an opioid are satisfactory for the majority of patients and practitioners. Nevertheless, the availability of propofol, a short-acting sedative agent, has demonstrated convincingly that it is possible to improve patient satisfaction for endoscopic procedures while, at the same time, increasing throughput in the endoscopy unit due to faster induction and recovery times.

In the future, the challenge will be to develop a drug or delivery system that provides the endoscopist with the capability of providing sedation safely, effectively and in a cost-effective manner. While increased volume may help defray some of the added costs of newer sedation methods, it is unlikely that the additional revenue and/or reduced overhead would be sufficient to offset an important difference in cost between standard sedation techniques and newer methods. In some areas of the world, the added financial burden of sedation is already more than many endoscopy units are able to manage. Consequently, it is important that new methods of sedation be cost-effective when compared with existing sedation modalities.

COMPARISON OF THE OMED/HSG/ESGE POSITION STATEMENTS WITH NATIONAL GUIDELINES AND PRACTICE STANDARDS

The Athens position statements were compared with five national guidelines or practice standards: British Society of Gastroenterology (BSG) guidelines 2003[1], the Spanish Society of Gastrointestinal Endoscopy (SEED) guidelines 2006[2], the Austrian Society of Gastroenterology and Hepatology (ÖGGH) 2007[3], the German Society for Digestive and Metabolic Diseases (DGVS) S3 guideline 2008[4] and the American Gastroenterological Association (AGA) guideline 2007[5]. Table 1 provides a summary comparison of these national guidelines, practice standards with the Athens statements. A consensus of opinion exists among the various professional societies regarding most issues.

CONCLUSIONS

Despite socio-cultural, economic and medicolegal differences that exist between countries throughout the world, a broad consensus of opinion was achieved among international experts with respect to many key principles and practices of sedation for digestive endoscopy. The following statements represent core concepts that the panel wished to highlight:

(i) Sedation improves patient tolerance and compliance for GI endoscopy and may also improve the quality of an endoscopic examination.

(ii) The process of informed consent should take place between the patient and the endoscopist before every endoscopic procedure.

(iii) Whenever possible, patients undergoing endoscopy should be offered the option of having the procedure either with or without sedation.

(iv) Monitoring of vital signs as well as the levels of consciousness and pain/discomfort should be performed on all patients undergoing endoscopy.

(v) Endoscopists and nurses with appropriate training can safely and effectively administer propofol to low-risk patients undergoing endoscopic procedures.

(vi) The comparative effectiveness of a benzodiazepine/opioid combination vs. propofol with respect to the efficacy and safety of upper endoscopy and colonoscopy should be studied prospectively.

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APPENDIX

OMED/HSG/ESGE Sedation Panel Participants.

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