

Airway Complications in Upper GI Endoscopy

Selected - Annotated Clinical Bibliography

The Burden of Gastrointestinal Disease

Burden of Gastrointestinal Disease in the United States: 2012 Update

Source: *Gastroenterology*. 2012;143(5):1179-1187 e1171-1173.

Authors: Peery AF, Dellon ES, Lund J, et al.

This retrospective review sought to compile the most recently available statistics on gastrointestinal symptoms, quality of life, outpatient diagnoses, hospitalizations, cost, cancer, mortality and endoscopic utilization from a variety of publicly- and privately-held databases. Gastrointestinal (GI) diseases affect an estimated 60 to 70 million Americans annually. In 2004, there were an estimated 4.6 million hospitalizations, 72 million ambulatory care visits and 236,000 deaths attributable to GI disease. In 2009, there were a total of 2,437,163 deaths in the United States with 245,921 attributable to an underlying GI cause (10%). Spending on GI diseases in the United States has been estimated at \$142 billion per year in direct and indirect costs. There were an estimated 6.9 million upper, 11.5 million lower, and 228,000 biliary endoscopies performed in the United States in 2009. The most common indications for upper endoscopy were reflux symptoms (24%), evaluation for any GI bleeding symptom (19%), and abdominal pain or bloating (18%). The authors concluded that GI diseases are a source of substantial morbidity, mortality and cost in the US.

Sedation Practices For Gastrointestinal Endoscopy

Sedation in gastrointestinal endoscopy: Where are we at in 2014?

Source: *World J Gastrointest Endosc*. 2015;7(2):102-109.

Authors: Ferreira AO, Cravo M.

This review examined the different sedation practices for gastrointestinal endoscopy around the world. In the United States, anesthesiologist involvement in endoscopy has doubled from 14% in 2003 to 30% in 2009, while non-anesthesiologist administration of propofol (NAAP) is becoming less common. In Europe, practices differ considerably. In most countries, routine diagnostic EGDs are performed without sedation, with colonoscopies being more likely to receive some form of sedation. The countries with the highest rates of propofol sedation are thought to be Switzerland and Germany with high rates of NAAP. NAAP is also a common practice in Denmark, Austria, Spain, Italy, Greece, the Netherlands and Sweden, while in France and Portugal, virtually all endoscopic sedation with propofol is performed with an anesthesiologist. The authors summarize the evidence comparing propofol to traditional sedation, including several randomized controlled trials and five systematic reviews. The results are consistent in showing a similar rate of adverse events with propofol versus traditional sedation. The authors note that there is some evidence to suggest that propofol may be appropriate for simple endoscopic procedures in low-risk patients even if administered by non-anesthesiologists, while evidence on propofol safety in complex procedures and high-risk patients is less robust and in these cases, the presence of an anesthesiologist should be considered.

Adverse Events Associated With Gastrointestinal Endoscopy

A national study of cardiopulmonary unplanned events after GI endoscopy

Source: *Gastrointest Endosc.* 2007;66(1):27-34.

Authors: Sharma VK, Nguyen CC, Crowell MD, Lieberman DA, de Garmo P, Fleischer DE.

This retrospective CORI (Clinical Outcomes Research Initiative) database review sought to determine the incidence of cardiopulmonary unplanned events (CUE) and various factors predicting CUE during GI endoscopy. Data on GI endoscopies from April 1997 to March 2002 reported were queried. The primary outcome measure was CUE associated with GI endoscopy. Events included any cardiopulmonary event, specific types of cardiopulmonary events, and unplanned interventions. Flexible sigmoidoscopies, unседated endoscopies, and endoscopies performed under propofol or general anesthesia (GA) were excluded from the analysis. Data on 324,737 unique procedures (esophagogastroduodenoscopy [EGD], 140,692; colonoscopy, 174,255; endoscopic retrograde cholangiopancreatography [ERCP], 6,092; and endoscopic ultrasound [EUS], 3,698) performed with the patient under conscious sedation were analyzed. Unplanned events were reported in 1.4% of procedures; 0.9% were associated with CUE. Rates of CUE with EGD, colonoscopy, ERCP, and EUS were 0.6%, 1.1%, 2.1%, and 0.9%, respectively. The authors concluded that during GI endoscopy with conscious sedation, a patient's age, higher ASA grade, inpatient status, trainee participation, and routine use of oxygen are associated with a higher incidence of CUE.

A study of the safety of current gastrointestinal endoscopy (EGD).

Source: *Endoscopy.* 2007;39(8):692-700.

Authors: McLernon DJ, Donnan PT, Crozier A, Dillon J, Mowat C.

This was a retrospective cohort study conducted in patients who underwent esophagogastroduodenoscopy (EGD) procedures at Ninewells Hospital in Dundee between 1 June 2000 and 31 May 2003. In total, 11,501 EGD procedures were performed in 8,926 patients. A panel of experts assessed the 30-day mortality associated with EGD. A total of 395 patients died within 30 days (all-cause 30-day mortality rate 4.4%). One patient death was caused directly by the EGD (procedure-caused mortality rate 1 in 9,000) and EGD was judged to have contributed to patient deaths at a rate of 1 in 182. Factors associated with these deaths were percutaneous endoscopic gastrostomy insertion, melena or hematemesis indications, and esophageal varices. The authors concluded that with a causal death rate of 1 in 9,000, EGD could be considered 'very safe'; however, certain patient groups demonstrated increased mortality, thus the risks and benefits of EGD should be evaluated on a case-by-case basis.

Incidence of Sedation-related Complications with Propofol use During Advanced Endoscopic Procedures

Source: *Clin Gastroenterol Hepatol.* 2010;8(2):137-142.

Authors: Cote GA, Hovis RM, Ansstas MA, et al.

This prospective analysis was performed on patients undergoing advanced endoscopic procedures at a tertiary care medical center. The primary outcome was to define the frequency of sedation-related adverse events and the need for one or more airway modifications during the endoscopy. A total of 799 patients were enrolled over 7 months. Procedures included endoscopic ultrasound (n=423), endoscopic retrograde cholangiopancreatography (n=336), and small-bowel enteroscopy (n=40). A total of 87.2% of patients showed no response to endoscopic intubation. Hypoxemia occurred in 12.8%, hypotension in 0.5%, and premature termination in 0.6% of the patients. No patients required bag-mask ventilation or endotracheal intubation. Body mass index, male sex, and ASA class of 3 or higher were independent predictors of airway modifications. The authors concluded that propofol can be used safely for advanced endoscopic procedures when administered by a trained professional.

Adverse Events Associated With Gastrointestinal Endoscopy (continued)

Clinical Characteristics and Mortality of Life-Threatening Events Requiring Cardiopulmonary Resuscitation in Gastrointestinal Endoscopy Units

Source: *Medicine (Baltimore)*. 2015;94(43):e1934.

Authors: Park HM, Kim ES, Lee SM, et al.

This was a retrospective observational study conducted in 6 tertiary hospitals in the Daegu-Gyeongbuk province in the southeastern part of South Korea. The study was designed to evaluate the clinical characteristics of emergency conditions requiring cardiopulmonary resuscitation (CPR) in gastrointestinal endoscopy (GIE) units and to assess the risk factors for mortality in these cases. Data were retrospectively collated from hospital CPR registries for the period of January 2012 to June 2014. Life-threatening cases (cardiac arrhythmia or respiratory failure requiring resuscitation, or patients in need of immediate medical attention), which occurred in the GIE unit of each hospital during this period were included in the study. Between January 2012 and June 2014, a total of 263,426 endoscopic procedures (EGD 178,624 [67.8%], colonoscopy 67,389 [25.5%], and endoscopic mucosal resection [EMR]/ endoscopic submucosal dissection [ESD] 17,413 [6.6%]) were performed across all six hospitals. During the same period, life-threatening conditions requiring CPR occurred in 40 cases (0.015%) (male 13, median age 61 years old [26–89]). Gastrointestinal bleeding (GIB), such as hematemesis or melena, was the most common indication for endoscopy (55%). The types of clinical situations encountered were as follows: respiratory insufficiency (47.5%), decreased blood pressure (25%), and cardiac arrhythmia (25%). Despite efforts to resuscitate, 18 patients (45%) died. GIB was the only independent risk factor for mortality. This study demonstrated that critical events requiring CPR occurred in GIE units at a rate of 15 per 100,000 cases (40/263,426) while the overall mortality rate from life-threatening events in the GIE unit was 6 deaths per 100,000 individuals (18/263,426).

Scoping our Practice: the 2004 Report of the National Confidential Enquiry into Patient Outcome and Death

Source: http://www.ncepod.org.uk/2004report/Full_Report_2004.pdf

Authors: Cullinane M., Gray AJG., Hargraves CMK., Lucas S., Schubert M., Sherry KM., Wardle T.

This retrospective audit reviewed data collected of deaths occurring in hospital between 1 April 2002 and 31 March 2003. Data were requested from all hospitals in England, Wales, Northern Ireland, Guernsey, the Isle of Man, the Defence Secondary Care Agency and hospitals in the independent sector. Cases were included if death occurred within 30 days of a therapeutic endoscopy, regardless of whether it was the last procedure or not. If more than one endoscopy was recorded in the death data, only the last procedure before death was included. 1,818 cases of GI therapeutic endoscopies (Percutaneous endoscopic gastrostomy [PEG]=719 [40%]; ERCP=237 [13%]; Upper GI=809[44%]; Lower GI=53[3%]) were included in the audit. 73% (1,320/1,818) of the cases were undertaken in patients over the age of 70 years. 91% of patients were admitted as emergencies, 76% of patients had ≥ 2 co-morbidities and 74% of cases were considered at a 'definite risk' of death or death was expected. 1,579 cases were analyzed after exclusion of patients who had a GA or were already on intermittent positive pressure ventilation (IPPV) at the time of their endoscopy, 79% (1,244/1,579) of patients received some form of intravenous sedation; of these, 14% experienced sedation overdose. Of those who received sedation or local anesthesia, 43% (575/1,346) of patients developed respiratory complications after their endoscopy and in 42% of cases there was no record of the use of contemporaneous monitoring. In patients undergoing upper GI endoscopy, other than progression of the medical condition, the most common complications were respiratory problems 21% (175/850), hemorrhage 17% (141/850) and cardiac problems 13% (111/850). **A key recommendation in the report is that "Hospitals should ensure that the appropriate monitoring equipment and resuscitation equipment is available in each of their endoscopy rooms and recovery areas."**

LMA® Gastro™ Airway: Preliminary Findings

Endoscopic success using LMA® Gastro™ for Upper Gastrointestinal Endoscopic Procedures: Preliminary Findings.*

Source: Posters presented at the American Society of Anesthesiologists Annual Meeting, Chicago, US, 2016
Data on File. MLIB-000411

Authors: Skinner M.,** Terblanche N., Middleton C., Choi-Lindberg D., Power E.

This was a single-arm, first-in-human trial in 300 patients undergoing upper GI endoscopy. These preliminary results summarize the findings from the first 160 patients. Eligible patients were American Society of Anesthesiologists (ASA) physical status 1 or 2 and were at low risk of aspiration. All patients received standardized total intravenous anesthesia; the LMA® Gastro™ Airway was inserted in accordance with the manufacturer's instructions. The primary outcome measure was successful endoscope insertion into the esophagus. Secondary outcome measures included insertion success and ease of insertion of the LMA® Gastro™ Airway, and ease of insertion of the endoscope through the device. The incidence of airway compromise, blood on the device and sore throat after removal were also recorded. The endoscope was inserted successfully on first attempt in 95.6% (n=153) of cases; the overall insertion success rate was 100%† (n=158). Endoscope insertion was considered "easy" in 97.5% (n=156) of cases. The LMA® Gastro™ Airway was inserted successfully in 98.8% (n=158) of cases and insertion was considered "easy" in 93.8% (n=150) of cases. The authors concluded that preliminary findings were promising with no endoscopic insertion failures rate reported to date. Trial completion is expected in late 2016.



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