

Capnography Reduces the Risk of Adverse Outcomes During Gastrointestinal Endoscopic Procedures with Sedation Administration

Presenting Author: Michael W Jopling MD, NorthStar Anesthesia, Springfield Regional Medical Center, Springfield, OH, USA

Co-Author: JieJing Qiu, MS, Medtronic, MITG, Health Economics and Outcome Research, Mansfield, MA, USA

Background/Introduction: While published evidence to date suggests that capnography monitoring during gastrointestinal endoscopic procedures reduces the incidence of hypoxemia, the association of capnography sensor use with incidence of adverse outcomes during these procedures has not been studied. Thus, our aim was to investigate the incidence of rescue events and adverse outcomes during gastrointestinal endoscopic procedures performed with sedation administration for an overall hospital patient population and for matched patients with and without capnography sensor utilization.

Methods: This was a retrospective analysis of all hospital patients between 2008 and 2013 reported in the Premier Database. Inpatients and outpatients undergoing diagnostic and procedural esophagogastroduodenoscopy (EGD), endoscopic retrograde cholangiopancreatography (ERCP), and colonoscopy were identified using a combination of CPT/ICD-9 codes. Analysis inclusion criteria also included patients with report of sedative medications, but excluded patients who received inhaled anesthesia agents on the procedure day. Patients were grouped into four mutually exclusive categories: (1) pulse oximetry (SpO₂) only, (2) capnography only, (3) SpO₂ and capnography, and (4) neither SpO₂ nor capnography. Comparisons between groups were made using multivariate logistic regression (MLR) analysis adjusted for age, gender, race, comorbid conditions, and hospital characteristics. Propensity-score matching was also used to compare patients with capnography sensor use to patients on whom only a SpO₂ sensor was used. The standard differences were calculated to measure how well the matched groups balanced. Key outcome measures included the incidence of rescue events, defined by administration of naloxone and/or flumazenil, and death.

Results: The inpatient analysis population included 258,262 patients and the outpatient population included 3,807,151 patients. Overall, capnography sensors (with and without SpO₂ sensors) were used in approximately 2% of patients, regardless of inpatient/outpatient classification. As expected, the inpatient population tended to be older (mean age: 64.3 years vs. 57.4 years) with a higher mean Charlson Comorbidity Index (2.53 vs. 0.39). For both the inpatient and outpatient populations, patients were predominantly white and approximately 50% male/female. For the inpatient population, MLR analysis for the PS matched samples indicated that the capnography sensor use was associated with 47% reduction in the odds of death (OR: 0.528 [95% CI: 0.401, 0.696]; p<0.0001), and 10% reduction in odds of naloxone and/or flumazenil administration (OR: 0.905 95% CI: [0.645, 1.271]; p=0.5661), compared to patients using SpO₂ sensor only. For the outpatient population, the MLR analysis using PS matched samples indicated that capnography sensor use was associated with 82% reduction in the odds of death (OR: 0.178 [95% CI: 0.016, 1.990]; p=0.16), and a 62% reduction in the odds of naloxone and/or flumazenil use compared to patients with SpO₂ sensor use only (OR: 0.385 [0.286, 0.520]; p<0.0001).

Conclusions: In hospital inpatients and outpatients undergoing gastrointestinal endoscopic procedures performed with sedation administration, capnography sensor use was associated with a reduced likelihood of rescue events and death. The use of capnography in these procedures is warranted.