CAPNOGRAPHY FOR MONITORING OF PHYSICIAN-LED PROCEDURAL SEDATION PROCEDURES AT GASTROINTESTINAL SERVICES

Gareth Corbett[1], Peter Pugh[1], Jurgen Herre[1], Teik Choon See[1], David de Monteverde-Robb[1], Rafael Torrejon Torres[2], Rhodri Saunders[2], Catherine Leonard[3], Amit Prakash[1]

1. Addenbrookes hospital, Cambridge, UK; 2. Coreva Scientific GmbH & Co. KG, Koenigswinter, Germany; 3. Medtronic UK, Watford, England

INTRODUCTION

- Physician-led sedation is commonly used during endoscopic procedures.
- There is still an open question around the optimal patient monitoring strategy during such procedures.
- Use of additional capnography has been shown to be associated with fewer patient respiratory compromise events than pulse oximetry alone.[1,2]
- To quantify and explore the impact of capnography on patient safety, a quality improvement initiative was undertaken for gastrointestinal (GI), interventional cardiology (IC), vascular access (VA), and respiratory medicine (RM) clinical services at a large UK teaching hospital.

METHODS

- The quality improvement design was pre- and post-implementation of capnography monitoring.
- Events as defined by the World Society for Intravenous Anaesthesia (SIVA) tool,[3] are shown in Table 1.
- A composite endpoint consisting of four target adverse events was defined prospectively.
- The four target events were:
  - Oxygen desaturation (75-90%) for <60s
  - Severe (<75% at any time) or prolonged (<90% for >60s) oxygen desaturation
  - Bradycardia (>25% increase from baseline)
  - Tachycardia (>25% decrease from baseline)
- A 20% reduction in this cumulative endpoint was agreed upon to be the quality improvement threshold.
- Data on procedures featuring procedural sedation were collected as a convenience sample between December 2017 and January 2020.
- The results were entered on-site in an Excel based data collection tool.
- No patient identifiers were recorded.

RESULTS

- The data from 1,401 procedures across the GI, IC, and RM services were collected.
- The first 666 procedures were pre-capnography (baseline), with the subsequent 735 post-capnography implementation (capnography).
- GI represented 601 of the procedures, with 262 collected at baseline and 339 with capnography.
- Over the 1,401 procedures, a 42.1% reduction ($p \leq 0.05$) in the incidence of the composite endpoint was recorded. (Figure 1)
- For the department of GI, 20 events were observed in the baseline procedures (0.076 events per procedure) and for the capnography arm 12 (0.035 events per procedure).
- Odds ratios were decreased for all American Society of Anesthesiologists (ASA) levels, with ASA III patients receiving capnography being associated with the lowest odds ratio [0.24 (95% CI: 0.06-0.94)] for the composite primary outcome compared to baseline.
- This represents a 53.9% reduction ($p \leq 0.05$) in the composite endpoint.

CONCLUSIONS

- **Implementing capnography monitoring led to a 42% overall and a 53.9% GI-specific reduction in the composite outcome patient safety events.**
- **Participating clinical (GI, IC, RM) services support capnography monitoring being added to the hospital's sedation guidelines.**
- **More data are required to explore whether reduction in more rare but severe patient outcomes can be realised with use of capnography monitoring.**

Minor risk descriptors	Sentinel risk descriptors
Oxygen desaturation (75-90% for <60s)	**Oxygen desaturation, severe (<75% at any time or prolonged <90% for >60s)**
Bradycardia	Apnoea, prolonged (>60s)
Tachycardia	Cardiovascular collapse/shock
Apnoea, not prolonged	Cardiac arrest/absent pulse
Airway obstruction	

Table 1 Standardised adverse events for procedural sedation according to the World SIVA International Sedation Task Force.[3] Adverse events in the cumulative endpoint are highlighted **in bold and blue.**

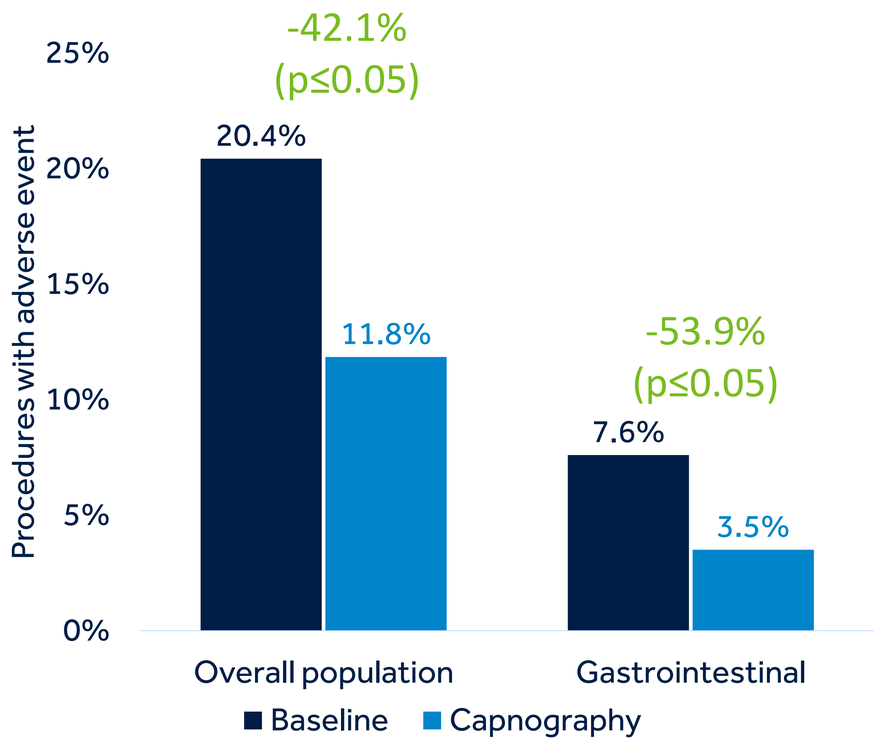

Figure 1 Composite endpoint incidence rates during baseline practice and with capnography

References

1. Saunders R et al. Patient safety during procedural sedation using capnography monitoring : a systematic review and meta-analysis. BMJ Open. 2017;:1–10.
2. Bisschops, R.; Saunders, R.; Dooms, C.; Hoffman, I.; van der Merwe, S.; Weissbrod, R.; Torres, R.T.; Van Assche, G.; Demedts, I. Implementing Capnography to Help Improve Patient Safety during Procedural Sedation: Quality Improvement in a High-Volume Gastroenterology Department. Eur. J. Gastroenterol. Hepatol. 2021, doi:10.1097/MEG.0000000000002144.
3. Mason, K.P.; Green, S.M.; Piacevoli, Q. Adverse Event Reporting Tool to Standardize the Reporting and Tracking of Adverse Events during Procedural Sedation: A Consensus Document from the World SIVA International Sedation Task Force. Br. J. Anaesth. 2012, 108, 13–20, doi:10.1093/bja/aer407.

Disclosure

JH, GC, PP, TCS, and DMR have nothing to disclose. RTT is an employee and RS is the owner of Coreva Scientific, which received consulting fees from Medtronic during the conduct of the study. CL is an employee of Medtronic UK, the funder of this study. AP reports non-financial support from Medtronic, in form of provisioning of monitors and training during the conduct of the study.

Research funded by Medtronic