

THE IMPACT OF SEDATIVE DRUGS ON VITAL SIGNS DURING PROCEDURAL SEDATION AND ANESTHESIA: A RETROSPECTIVE COHORT ANALYSIS (5PSQ-180)

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BACKGROUND

- Anesthetic drugs are vital during surgical procedures to lower patient discomfort, but carry significant risks for adverse events, in particular bradycardia, apnea, oxygen desaturation and blood pressure drop. Regular analysis and follow-up of possible patterns in anesthetic-related adverse drug events (ARAEs) is therefore required.
- Conducting such periodic reviews is also part of quality & patient safety standards of several hospital accreditation organizations.

OBJECTIVES

- To examine ARAE occurrence and trends during selected high-frequency procedures (gastro-/colonoscopy (GCS), cardiac ablation (CA), and electrical cardioversions (EC)) requiring general anesthesia in a university hospital, Belgium.
- To identify actionable patient- or procedure-related factors related to increased ARAE risk

METHODS

Inclusion criteria

- Adult patients with GCS, CA or EC procedure performed between 01/07/2017 - 30/06/2019
- 10% block-randomized sample and stratified according to procedure, age & gender
- EC procedures were excluded during pilot testing due to insufficient documentation

Data

- Patient characteristics: physiological parameters, American Society of Anesthesiologists (ASA) risk score, chronic home medication (HM), premedication before procedure, allergies, obesity, smoking history
- Procedure characteristics: used anesthetics/antidotes + cumulative doses, anesthesiologist's experience, date & time of procedure, difficulty of intubation, availability of documentation (in particular anesthesiology files)
- Occurrence of any ARAE: 1. Oxygen saturation <90%V/V
2. Bradycardia <45/min
3. Blood pressure drop >20%
4. Apnea

Analysis

- Spearman analysis to select potential predictors (p<0.2)
- Backward logistic regression analysis
- Times series analysis on ARAE occurrence & absence of anesthesia files
- Benchmarking found cases vs. WHO trigger tool with antidote (ephedrine, norepinefrine, phenylephrine, atropine) use as primary trigger to detect ARAEs vs. voluntary reporting to local care quality department

RESULTS

- 1355 cardiac ablation procedures and 1475 gastro-/colonoscopies were eligible with 283 patients (135 CA/148 GCS procedures) selected for analysis.
- Median patient age: 59 y (IQR 47-69); male/female: 117/166; 77% of patients had ASA-score ≥ 3.
- 15,5% (37 CA/7GCS) of anesthesia files incomplete/missing
- 72,8% of patients experienced at least 1 ARAE (174/239) with majority experiencing low blood pressure (169/174), followed by bradycardia (15/174), oxygen desaturation (3/174) and apnea (1/174).

Table: Patient-/procedure-related risk factors for ARAEs

	Predictors	B(S.E.)	p-value	Odds Ratio
 <p>Any ARAE</p>	Midazolam premedication	1,615 (0,766)	0,035	5,027
	Opioids HM	2,013 (1,045)	0,054	7,489
	Serum albumin	0,016 (0,009)	0,064	1,016
	Inhalation anesthetic	1,009 (0,446)	0,024	2,743
	Systolic blood pressure	0,017 (0,005)	0,001	1,017
 <p>SpO₂ < 90 %</p>	Creatinine clearance	0,048 (0,022)	0,033	1,049
	Opioids HM	4,076 (2,621)	0,120	58,882
	ACE-inhibitor/sartan HM	4,295 (2,154)	0,046	73,324
 <p>Blood pressure drop >20%</p>	Any premedication	0,547 (0,324)	0,092	1,729
	Opioids HM	1,021 (0,653)	0,118	2,775
	Systolic blood pressure	0,016 (0,005)	0,001	1,016
 <p>Bradycardia</p>	Amiodarone/verapamil HM	1,740 (0,821)	0,034	5,698
	Inhalation anesthetic	1,678 (0,569)	0,003	5,356

Midazolam premedication was an important predictor of any ARAE, next to use of an inhalation anesthetic and a worrying trend for opioid HM. Patients on amiodarone/verapamil HM or an inhalation anesthetic were more at risk for bradycardia while ACE-inhibiting medication increased desaturation risk. No directly actionable patient- or procedure-related risk factors could be found for blood pressure drop and apnea.

Table: Sensitivity/specificity of WHO trigger tool

Using WHO trigger tool to detect:	Sensitivity	Specificity
Any ARAE	20,11 %	96,92 %
SpO ₂ < 90 %	33,33 %	84,75 %
Blood pressure drop >20%	20,12 %	95,71 %
Bradycardia	20,00 %	87,50 %

WHO trigger tool benchmark: high specificity but low sensitivity!
Voluntary reporting: only 2 ARAE cases were reported.

Figure: Percentage of patients with any ARAE over time



Time series analysis revealed no time-dependent trends in the occurrence of ARAEs or incomplete files.

CONCLUSIONS

- The impact of ACE-inhibitors on ARAEs is well known, with a preprocedural stop suggested. Benefits and consequences of such interruption are not clear but these results warrant sufficient attention.¹
- Preprocedural midazolam and other sedatives may need review, as other measures to decrease anxiety are also effective with less adverse effects.²
- In order to detect ARAEs, the WHO trigger tool shows severe shortcomings and may need to be supplemented.
- Finally, correctly documenting anesthetic procedures and sensibilisation towards ARAE reporting is needed.

References: ¹Hollmann et al. *Anesth Analg.* 2018;127(3):678-687. ²Jlala et al. *Br J Anaesth.* 2010;104(3):369-74.