Remimazolam Use During Gastrointestinal Procedural Sedation

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BACKGROUND

- 15 million GI procedures each year (Penn Medicine, 2019)
- Midazolam based sedation
  - Slow - 80 min duration (Flood & Rathmell, 2022)
  - RN administration
- Propofol based sedation
  - Quick – 5-10 min duration (Flood & Rathmell, 2022)
  - Anesthesia administration
- Remimazolam
  - New ultra-short acting benzodiazepine
  - 11-14 min duration of action (Kim, 2022)
  - Potential for RN administration
- AIMs are to show that remimazolam:
  - As effective for sedation as propofol
  - More hemodynamically stable
  - Time effective
- GOAL: RN sedation Protocol

QI QUESTION

In American Society of Anesthesiologists (ASA) class I to IV patients, 18 to 90 years of age undergoing colonoscopy and esophagogastroduodenoscopy (EGD), does remimazolam and fentanyl compared to standard sedation (propofol, midazolam, and fentanyl) provide as effective procedural sedation while being safer as evidenced by decreased adverse events (hypoxemia, hypotension, bradycardia) and provider judgement at a midwestern tertiary hospital over a four-month period?

METHODOLOGY

- IRB
  - Deemed Quality Improvement (QI)
- Quality improvement project
  - Midwestern tertiary hospital: GI suites
- Retrospective chart review
  - Match control: 30 patients each group
  - Match criteria: ASA, age, procedure
  - Exclusion: Pregnancy, allergies, abnormal vital signs
- Qualitative Staff Survey
  - Effectiveness and safety of remimazolam

RESULTS

Table 1

Demographic Analysis

	Remimazolam (Intervention, $n = 30$)	Propofol (Control, $n = 30$)	*p*-value
Case type			
Colonoscopy	23 (76.7%)	23 (76.7%)	1.0
EGD	7 (23.3%)	7 (23.3%)	
Age (years)	63 (± 14)	63 (± 14)	.95
ASA Physical Classification			
1-2	11 (36.7%)	11 (36.7%)	1.0
3-4	19 (63.3%)	19 (63.3%)	
Sex			
Male	15 (50%)	18 (60%)	.44
Female	15 (50%)	12 (40%)	
Height (cm)	169 (± 8.5)	171 (± 11.8)	.49
Weight (kg)	89.3 (± 22.6)	90.7 (± 23.9)	.81
BMI	31.3 (± 7.8)	30.5 (± 7.3)	.70

Note. EGD = esophagogastroduodenoscopy; ASA = American Society of Anesthesiologists; BMI = body mass index.

- Three themes from staff survey:
  - Frequent bolusing or redosing of remimazolam and an infusion may be beneficial
  - Propofol provides better sedation than remimazolam
  - Remimazolam has a better safety profile than propofol

RESULTS CONTINUED

Table 2

Conversion and Mean Physiological Data Analysis

	Remimazolam (Intervention, $n = 30$)	Propofol (Control, $n = 30$)	*p*-value
Converted	11 (36.7%)		
Converted at end of vial	9 (30%)		
Bradycardia (no. of occurrences)	0.1 (± 0.4)	0.9 (± 3.5)	.23
Tachycardia (no. of occurrences)	1.3 (± 4.5)	0.3 (± 1.0)	.25
Preoperative systolic BP	141 (± 21)	144 (± 17)	.60
Hypotension (no. of occurrences)	3.4 (± 4.9)	4.3 (± 4.5)	.50
Hypertension (no. of occurrences)	0.3 (± 0.8)	0.1 (± 0.5)	.28
Bradypnea (no. of occurrences)	0.1 (± 0.3)	0.1 (± 0.4)	.65
Tachypnea (no. of occurrences)	0.1 (± 0.3)	0.1 (± 0.4)	.43
Hypoxemia (min)	0.4 (± 1.2)	0.4 (± 1.4)	.92
Oxygen (L/min)	9.3 (± 3.8)	8.8 (± 3.5)	.73
Oxygen delivery device			
Nasal Cannula	2 (6.7%)	7 (23%)	
Facemask	18 (60%)	17 (57%)	.15
Not recorded	10 (33%)	6 (20%)	

Note. BP = blood pressure.

Table 3

Pharmacological Data Analysis

	Remimazolam (Intervention, $n = 30$)	Propofol (Control, $n = 30$)	*p*-value
Remimazolam (mg)	23 (± 9.3)	0 (± 0)	<.001
Propofol (mg)	79 (± 140)	385 (± 227)	<.001
Fentanyl (mcg)	80 (± 40)	25 (± 42)	<.001
Midazolam (mg)	0 (± 0)	0.46 (± 0.85)	<.01
Phenylephrine (mcg)	10 (± 54)	90 (± 197)	.04
(Number of cases used in)	1 (3.3%)	6 (20%)	
Ephedrine (mg)	0.2 (± 1.8)	1.5 (± 5.6)	.30
(Number of cases used in)	1 (3.3%)	2 (6.6%)	
IV fluids (mL)	645 (± 182)	525 (± 207)	.02

Note. IV = intravenous

DISCUSSION

- High rate of conversion (11 of 30)
  - May indicate ineffectiveness however 9 of 11 converted at end of vial indicating possible supply issue
- Hemodynamically more stable
  - Significantly less phenylephrine use
  - Expert opinion of anesthesia providers

DISCUSSION CONTINUED

- More fentanyl administration
  - Possibly due to remimazolam providing a different type and depth of sedation compared to propofol
- Remimazolam is as time effective for sedation as propofol
- Implications
  - Remimazolam is safe for RN sedation
  - Remimazolam may be effective for sedation with adequate medication supply
- Recommendations for RN sedation
  - Midazolam for baseline sedation
  - Large supply of remimazolam in room
  - Study comparing remimazolam and midazolam sedation by RNs

LIMITATIONS

- Sample was not powered
- Sample size reduced and inclusion criteria expanded due to limited remimazolam use
- Retrospective design allows provider bias
- Preoperative vital signs were often erroneous
- Provider bias toward propofol use

PAPER AND REFERENCES