Multicenter Review of Practice Patterns Regarding Benzodiazepine Use in Cardiac Surgery

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Disclosures

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- I have financial relationship(s) with:
  - **Grant / Research (current)**:
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- My presentation does not include discussion of off-label or investigational use drugs or devices.

Introduction

There is little clarity on the impact of intraoperative benzodiazepines

- Benzodiazepine-sparing techniques are used due to the evidence in the ICU population relating benzodiazepine use to delirium[1-13]
- Others routinely administer benzodiazepines for their amnestic properties for concern of intraoperative awareness in the higher risk cardiac surgery population[1,4,14-16]

Practice patterns are dogmatic and debated

Clinical trials are underway studying outcomes related to benzodiazepine use,[4] but little is known about benzodiazepine use patterns beyond survey data[1]

Introduction

Aims

- Describe benzodiazepine use during cardiac surgery across MPOG centers
- Identify patient factors associated with benzodiazepine use
- Describe the prevalence and variation of benzodiazepine use for cardiac surgeries across patients, providers, and institutions
- Provide context for the future findings of clinical trials studying outcomes related to benzodiazepine administration

Hypothesis

- Patient, provider, and institutional factors were independently associated with benzodiazepine use during cardiac surgery, and patient factors are **not** the primary driver of variation in use

Methods

Study Cohort

- Adults who underwent elective or urgent cardiac surgical procedures from January 1, 2014 until August 1, 2019 at MPOG institutions

Exclusions

- ASA 5 or 6
- Lung transplants, heart transplants, mechanical circulatory support, aortic procedures, procedures requiring circulatory arrest or transcatheter procedures
- Case duration <120 minutes

Methods

Primary outcome: Exposure to benzodiazepines

- Defined as a bolus or infusion of midazolam, alprazolam, diazepam, clonazepam or lorazepam given within two hours of anesthesia start and anesthesia end

Methods

Covariates

- Patient level
  - Demographic data
  - Surgery type and duration, whether bypass was used
  - Comorbidities
  - Year of surgery
- Provider level
  - Case volume/year
- Institutional level
  - University affiliation
  - Case volume/year

Methods

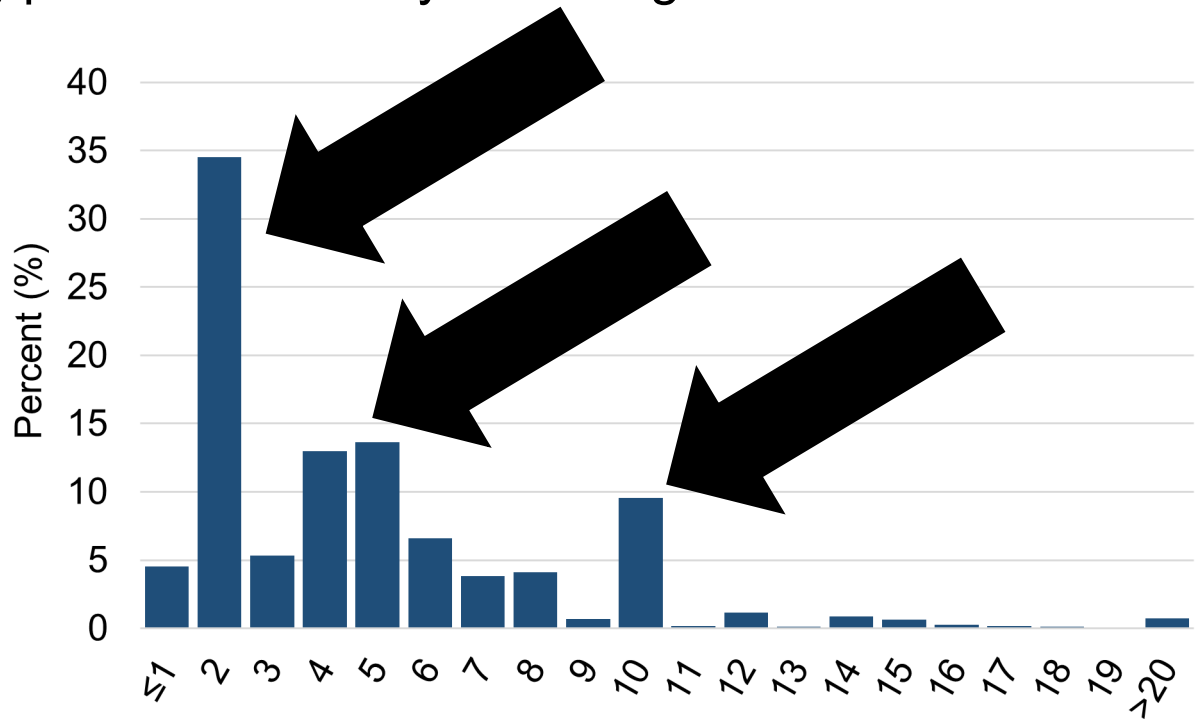
Statistical Analyses

- Mixed effects and multilevel models to assess random versus fixed effects of variation in benzodiazepine use
- Assessment of variance using variance estimates and median odds ratios (MORs)
- Goal is to inform us on the proportion of total variance in the outcome that is attributable to that factor

Results

65,508 patients across 33 MPOG institutions were included

- 58,004 (88.5%) patients received a benzodiazepine
- Median midazolam-equivalent dose of 4.0mg (IQR 2.0-6.0mg)
- 29,824 (84.4%) patients over 65 years of age received benzodiazepines



2A.

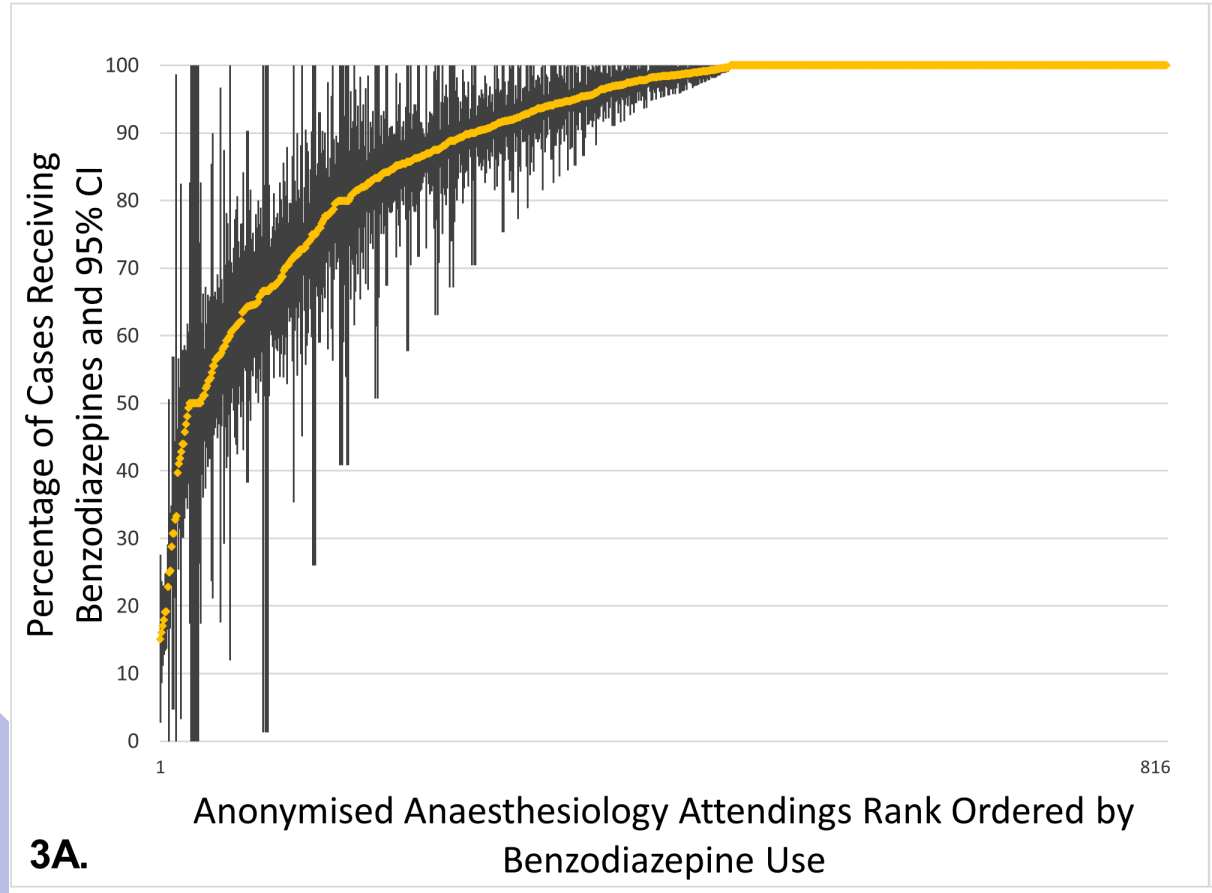
Results

Preliminary *unadjusted* generalized linear mixed models showed:

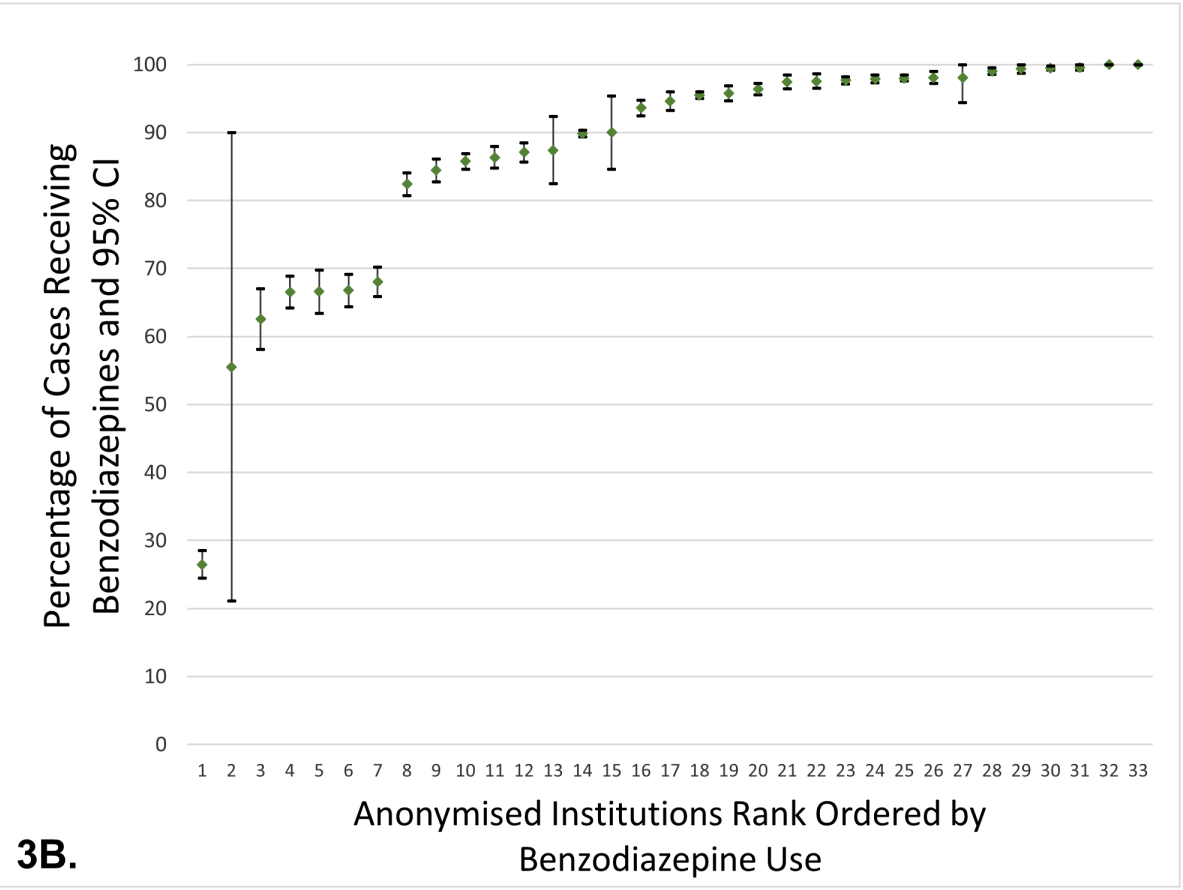
- 30.5% of the variation was explained by patient factors
- 14.7% by the primary provider
- 54.7% by the institution

Over **two-thirds** of the variation was explained by provider and institution

Results



3A.



3B.

Results

Adjusted multilevel models showed that factors strongly associated with a ***decreased*** likelihood of benzodiazepine administration included:

- Older age, >80 years versus ≤50 years, **aOR 0.04**, 95% CI 0.04-0.05, p<0.0001
- Recent year of surgery, 2019 versus 2014, **aOR 0.42**, 95% CI 0.37-0.49, p<0.0001
- University-affiliation, **aOR 0.08**, 95% CI 0.02-0.35, p=0.0007
- Low provider case-volume, **aOR 0.44**, 95% CI 0.25-0.75, p=0.002

Adjusted multilevel models showed that factors strongly associated with an ***increased*** likelihood of benzodiazepine administration included:

- History of drug abuse, **aOR 1.29**, 95% CI 1.02-1.65, p=0.04
- Use of cardiopulmonary bypass, **aOR 2.26**, 95% CI 1.99-2.55, p<0.0001

Results

Primary Analysis:

- Adjusted MORs for receiving a benzodiazepine:
  - **2.7** between randomly selected **providers**
  - **4.2** between randomly selected **institutions**

Low vs. High Dose Secondary Analysis:

- Adjusted MORs for receiving <0.05mg kg^{-1} vs. ≥0.05mg kg^{-1}
  - **3.1** between randomly selected **providers**
  - **6.9** between randomly selected **institutions**

Results

Increased Risk of Hemodynamic Instability Cohort *A Priori* Sensitivity Analysis:

- Adjusted MORs for receiving a benzodiazepine:
  - **2.1** between randomly selected **providers**
  - **3.5** between randomly selected **institutions**

Starting Provider *Post-hoc* Sensitivity Analysis:

- Adjusted MORs for receiving a benzodiazepine:
  - **2.9** between randomly selected **providers**
  - **4.3** between randomly selected **institutions**

Discussion

Conclusions

- **Institution and provider** as opposed to patient factors accounted for over **two-thirds** of the variation of benzodiazepine administration

Limitations

- MPOG does not include ALL institutions providing cardiac surgical care
- Most institutions (27/33) were university-affiliated

Future Directions

- These data may serve as a model for understanding cardiac anesthesiology practice variation provide context for the findings of randomized trials evaluating intraoperative benzodiazepine administration and outcomes

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Thank You

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Questions?