

## Background

- Studies are limited in exploring the effects of phosphodiesterase-5 inhibitors (PDE5Is) under anesthesia.
- PDE5Is work on the cyclic guanosine monophosphate (cGMP) 2<sup>nd</sup> messenger system by blocking the phosphodiesterase-5 enzyme from breaking down cGMP resulting in continued vasodilation.
- The corpus cavernosum of the penis, lung, and retina are rich in the phosphodiesterase-5 enzyme.
- Erectile Dysfunction affects > 30 million men in the United States (US).
- ~3 million sildenafil prescriptions were filled in 2020
- The additive vasodilatory effects of inhaled anesthetic agents and PDE5Is can lead to profound intraoperative hypotension resulting in adverse events such as end-organ injury/failure, myocardial infarction, and vision impairment/loss.

## Purpose

- To report and spread awareness on the incidence and magnitude of intraoperative hypotension with PDE5I use and contributing risk factors.

- To investigate the relationship between the timing of the last PDE5I dose and the degree of intraoperative hypotension to allow the establishment of a cessation recommendation for PDE5Is before general anesthesia.

## Methods

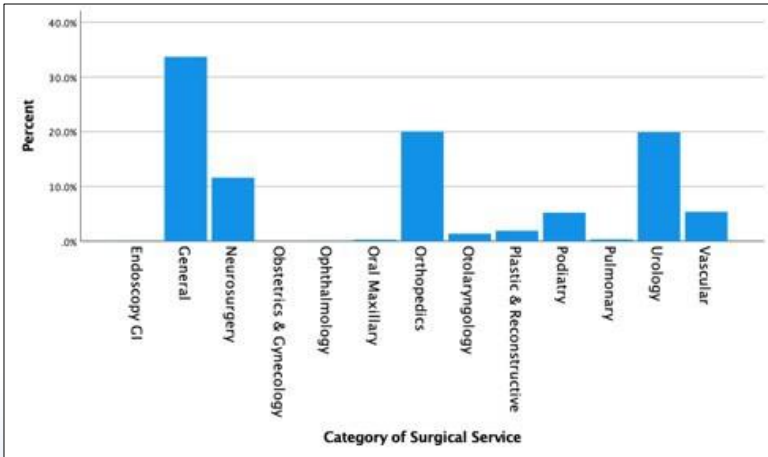
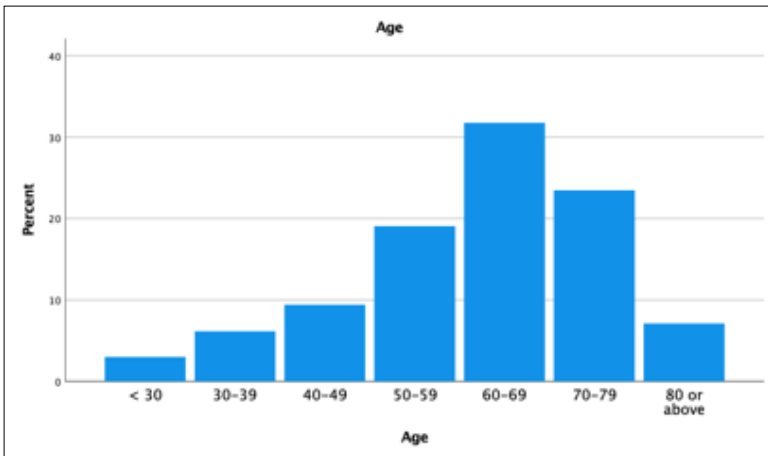
- A non-experimental, causal-comparative retrospective design with a nonprobability convenience sampling method.
- A multi-hospital study utilizing one healthcare system in the southeast US.
- Inclusion criteria:** patients who underwent elective surgery requiring inhalational general anesthesia in the period from January 2021 until 30 June 2023, male gender, and ≥ 18 years of age (n = 6,352).
- Exclusion criteria:** female gender, patients < 18 years of age, emergency surgeries, and surgical procedures not utilizing an inhalational general anesthetic.
- PDE5I use was measured by whether the patient had an active prescription or not.
- Intraoperative hypotension was measured using both systolic blood pressure (SBP) and mean arterial pressure (MAP).
- Expedited review requested and approved by the IRB (Eastern Virginia Medical School (EVMS) & Old Dominion University)
- Retrospective data collected from chart reviews by the Sentara Research, Analytics, and Data Science team via REDCap
- Data converted and analyzed in SPSS 28.0 by research team
- Descriptive statistics used to describe sample demographics
- Chi-square or Fisher’s Exact used for all categorical, nominal data
- Independent t-test used for all ratio data

## Acknowledgments

Enterprise Analytics with Sentara Healthcare, ODU, EVMS, and Kimberly Edwards McClain BSN, RN for her contribution in assessing preoperative documentation.

## Phosphodiesterase-5 Inhibitor Use and Intraoperative Hypotension During General Anesthesia: A Non-Experimental, Causal Comparative Retrospective Study

### Demographics



| Statistics                    |         |      |  |
|-------------------------------|---------|------|--|
| Patient Age on Day of Surgery |         |      |  |
| N                             | Valid   | 6352 |  |
|                               | Missing | 0    |  |
| Mean                          | 61.47   |      |  |
| Median                        | 64.00   |      |  |
| Mode                          | 67      |      |  |
| Std. Deviation                | 14.194  |      |  |
| Range                         | 77      |      |  |

| Active prescription for PDE5I |       |           |         |               |                    |
|-------------------------------|-------|-----------|---------|---------------|--------------------|
|                               |       | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                         | No    | 5669      | 89.2    | 89.2          | 89.2               |
|                               | Yes   | 683       | 10.8    | 10.8          | 100.0              |
|                               | Total | 6352      | 100.0   | 100.0         |                    |

| ASA Physical Status Score |        |           |         |               |                    |
|---------------------------|--------|-----------|---------|---------------|--------------------|
|                           |        | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                     | ASA 1  | 171       | 2.7     | 2.8           | 2.8                |
|                           | ASA 2  | 2180      | 34.3    | 35.8          | 38.6               |
|                           | ASA 3  | 3320      | 52.3    | 54.6          | 93.2               |
|                           | ASA 4  | 415       | 6.5     | 6.8           | 100.0              |
|                           | Total  | 6086      | 95.8    | 100.0         |                    |
| Missing                   | System | 266       | 4.2     |               |                    |
| Total                     |        | 6352      | 100.0   |               |                    |

## Results

**RQ1:** Is there a difference in socio-demographic characteristics between male patients undergoing general anesthesia who have an active PDE5I prescription and males undergoing general anesthesia who do not have an active PDE5I prescription?

### *Findings:*

- PDE5I active prescription = **AP**, PDE5I no active prescription = **NAP**

- AP** group had a statistically higher percentage of patients with hypertension (70.1% vs. 65.2%), diabetes mellitus II (30.6% vs. 26.8%), & hyperlipidemia (55.3% vs. 42.9%)
- No statistical significance between groups for the history of coronary artery disease or obesity.
- AP** group had a statistically significant greater average count of antihypertensive prescriptions (1.74 vs. 1.51)
- AP** group had a statistically significant higher % of patients with 2 or more active antihypertensive medications (52.0% vs. 46.4%)
- AP** group had a statistically significant higher % of patients with active prescriptions for alpha-blockers (30.9% vs. 23.1%), angiotensin-converting enzyme inhibitors (24.3% vs. 20.5%), angiotensin-II receptor uptake inhibitors (26.4% vs. 20.0%), calcium channel blockers (31.5% vs. 26.7%), and diuretics (30.5% vs. 25.7%)
- NAP** group had a statistically significant higher % of patients with active prescriptions for direct vasodilators (9.3% vs. 6.9%)
- No statistical significance was found between groups for beta blockers and mixed alpha-beta blockers

## Results (contd.)

**RQ2:** Are male patients who have an active prescription of a PDE5I more likely to experience hypotension during general anesthesia than males undergoing general anesthesia who do not have an active prescription of a PDE5I?

**RQ3:** Is there a difference in the percentage decrease in systolic blood pressure and mean blood pressures (MAP and MNIBP) during general anesthesia in males who have an active PDE5I prescription and males who do not have an active PDE5I prescription?

### *Findings:*

- The **AP** group had a statistically significant higher % of patients with a drop in SBP drop ≥ 20% (95.3% vs. 92.5%) and ≥ 30% when compared to the **NAP** group (79.7% vs 74.3%).
- Not statistically significant, but the **AP** group did have a higher percentage of patients with a SBP drop ≥ 10% when compared to the **NAP** group (98.5% vs 98.2%)
- Not statistically significant, but the **AP** group did have a higher percentage of patients with a MAP drop ≥ 10% (98.5% vs 97.9%), ≥ 20% (92.1% vs. 90.3%), and ≥ 30% (71.8% vs 68.9%) when compared to the **NAP** group.

**RQ4:** What is the relationship between the timing of the last PDE5I dose and the incidence and magnitude of hypotension in male patients undergoing general anesthesia?

### *Findings:*

- PDE5I taken within 48 hours of surgery = **AP48**, PDE5I not taken within 48 hours of surgery = **NAP48**
- Not statistically significant, but the **AP48** group did have a higher % patients with a SBP drop ≥ 10% (100% vs. 98.2%), ≥ 20% (97.1% vs. 92.7%), and ≥ 30% (81.2% vs. 74.8%) when compared to the **NAP48** group.
- Not statistically significant, but the **AP48** group did have a % percentage of patients with a MAP drop ≥ 10% (100% vs. 97.9%), ≥ 20% (100% vs. 97.9%), and ≥ 30% (72.5% vs. 69.2%) when compared to the **NAP48** group.

**RQ5:** Is there a difference in administered amounts of rescue medications for hypotension given to males under general anesthesia who have an active PDE5I prescription compared to male patients under general anesthesia who do not have an active PDE5I prescription?

### *Findings:*

- No statistical significance was found between patients with PDE5I active prescriptions and rescue medications given intraoperatively

## Conclusion/Limitations

- Risk of intraoperative hypotension is multifactorial including comorbidities, genetics, prescribed medications, and age.
- Some aspects of anesthesia that may contribute to intraoperative hypotension include surgical position, blood loss, drugs administered, and depth of anesthesia.
- Some results may not have been statistically significant due to the complexity of factors contributing to intraoperative hypotension.
- Small PDE5I active prescription group
  - Active prescription vs. actively taking the medication
- Retrospective design
  - Data gathered is limited to information collected from the multidisciplinary team
- Lack of capture
- Inconsistencies in charting
- Artifact in blood pressure readings
- Target more specific age groups
  - Ex. ≥ 40 years old vs. ≥ 18 years old