# Hypotension Prediction Algorithm Utilization in Non-Cardiac Surgery

Blake Timothy & Jamie Wilson
Florida State University Panama City

## Abstract

Low blood pressure during surgery is associated with an increased incidence of acute kidney injury (AKI), cardiovascular complications, and mortality, yet it is commonly underrecognized prior to its onset. The Hypotension Prediction Algorithm (HPA) is a novel monitoring technology designed to predict impending hypotension, allowing clinicians to intervene earlier. This project reviewed existing literature and surveyed anesthesia providers at a community hospital to identify factors limiting HPA utilization. Key barriers included limited equipment availability and workflow constraints, which informed targeted education and process improvements aimed at promoting safer, more proactive intraoperative blood pressure management.

## Introduction

Low blood pressure has an inaccurate reputation as a benign complication of surgery; however, patients who experience intraoperative hypotension have increased rates of AKI, postoperative myocardial ischemia, and 30-day mortality (Yerdon et al., 2024). At a community hospital in West Tennessee, the anesthesia leadership is committed to reducing AKI rates experienced by the hospital's surgical patients. Preventing low blood pressure is a modifiable risk factor that will reduce AKI in surgical patients (Yerdon et al., 2024). HPA monitoring is a viable, yet clinically underutilized evidence-based tool that has been shown to reduce intraoperative hypotension (IOH) among surgical patients (Wijnberge et al., 2020). In synergy with leadership goals, we framed our clinical improvement project around the following PICO question: Do (P) noncardiac surgical patients who (I) intraoperatively receive standard hemodynamic monitoring with hypotensive predictive algorithm software compared to (C) those who only receive standard hemodynamic monitoring (O) experience less intraoperative hypotension?

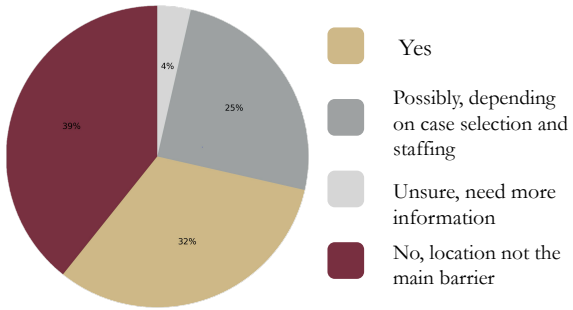
## Methods

HPA equipment specialists provided education sessions to staff on the use of the HPA devices. An 8-question survey was created to assess staff utilization and identify barriers to greater utilization. An anonymous survey link was distributed to all staff and remained open for two weeks. Participation was encouraged during morning staff meetings to maximize response rates.

## Results

Thirty-two anesthesia providers (23 CRNAs and 9 SRNAs) completed the survey assessing barriers to HPA use, opinions on workflow changes, and open-ended feedback. Relocating ClearSight finger cuffs to the preoperative holding area was viewed as a potential facilitator, with 57% of respondents indicating it would increase their likelihood of using HPA, while the most common barrier remained limited equipment availability—primarily an insufficient number of monitors. Open-ended responses further emphasized the need for increased monitor access, improved workflow efficiency, and enhanced provider education to support consistent HPA utilization.

Would moving ClearSight finger cuffs to the Pre-Op Holding Area increase your utilization of ClearSight on appropriate patients?




**ClearSight finger cuffs are supplies utilized for an HPA modality*

## Discussion

Survey results indicate that limited access to equipment—particularly monitor availability—is the primary barrier to consistent use of the HPA technology, outweighing workflow inefficiency and provider attitudes. More than half of respondents felt that placing ClearSight finger cuffs in the preoperative holding area could increase HPA use by improving convenience, though others noted that familiarity, confidence in the technology, and workflow also influence adoption. Overall, respondents emphasized that improving equipment availability, streamlining workflows, and providing ongoing education are essential to increasing consistent HPA utilization.

### Sustainability

- **Education:** Maintain provider competency through semiannual education sessions, brief digital reminders, hands-on demonstrations, and designation of an HPA champion for ongoing support and accountability.
- **Equipment access:** Ensure reliable availability of monitors and consumables by standardizing stocking, maintenance, and preoperative storage in collaboration with supply chain and biomedical teams.
- **Workflow optimization:** Improve efficiency by relocating ClearSight cuffs to the preoperative area, standardizing setup processes, and reducing variability across operating rooms.
- **Performance monitoring:** Track HPA utilization and intraoperative hypotension metrics and review results during quality improvement meetings to reinforce value and guide practice.
- **Ongoing evaluation:** Conduct structured re-evaluations at 6 and 12 months to assess utilization, equipment access, workflow effectiveness, and provider feedback, allowing timely adjustments to sustain adoption..

## References

https://fsu-my.sharepoint.com/:w:/g/personal/bt23e_fsu_edu/IQDct2fRnNnGTIGhC2dBjMHqAQCLAYuEcTm7xsJvHEaHCEI?e=ZI5xzJ