

## RESPIRO: THE WASTE ANESTHETIC SCAVENGING DEVICE

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**Introduction:** My team's project focus was on mitigating the exposure of medical personnel to waste anesthetic gases. Inadequate mask fit, patient anatomy, and other factors are all sources that may cause providers to be exposed to waste anesthetic.<sup>1</sup> Short term exposure to hospital staff may cause headaches and cognitive impairment, while the long term exposure may be more serious. Staff exposed over a long period of time may be more likely to suffer from a miscarriage, congenital defects in their children, liver damage, and kidney damage.<sup>2,3</sup>

**Methods:** In order to find a solution to this problem, we utilized the design thinking process of empathize, define, ideate, prototype, and test. My team empathized with providers exposed to waste anesthetic and defined the problem as waste anesthetic escaping from the mask during induction. We believed this problem to be a major contributing factor to waste anesthetic and one where we could design a product to solve this. Utilizing rapid 3D printing, multiple designs were created to determine the ideal size and shape in order to trap waste anesthetic and scavenge it away. The design also had to not interfere with the providers hand placement and grip.

**Results:** Our project, titled Remora, is a transparent, flexible, and disposable outer shell which attaches to existing anesthesia masks. Remora consists of a soft outer frame that is designed to trap any waste anesthetic gas for the inner more ridged frame that scavenges the gas. To attach the device, simply remove the paper tab to expose the adhesive and press Respiro onto the brim of the anesthesia mask. It is then able to be attached to an existing suction port on the anesthesia machine to scavenge waste anesthetic away from the breathing zone of the provider.

**Conclusion:** Remora is a valuable addition to any basic anesthesia circuit kit and can easily be added to existing products. The design is made to not infer with the provider while also protecting them from potential long term effects. While our device is designed for adult sized anesthesia mask, my team and I wish to continue research and develop to create a version for pediatric masks, where gas induction is used more frequently. My team and I currently have a provisional patent for Respiro and with the help of Thomas Jefferson University have filed for a full U.S. patent.

### References

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