

# THERAPEUTIC INCENTIVE SPIROMETER

# Abstract

**Surgical procedures** requiring general anesthesia can collapse a patient's alveoli or even an entire lung lobe which can result in negative health outcomes including pneumonia and low blood oxygen levels.

**Post-surgery**, slow and deep breathing inhalation exercises – via volumetric incentive spirometers – serve to reopen the lung's air sacs and restore lung capacities. Thus, improving patient adherence and accuracy of sustained maximal inhalation data are key to rehabilitation.

**This project aims to** design an incentivizing monitoring device with a user display interface, attachable to the Voldyne 5000 spirometer model, and to improve the material efficiency and grip ergonomics of the model.

### Background

### **Current Standard of Care & Challenges**



**Voldyne 5000** is the current standard of care for postoperative prevention for general anesthesia induced atelectasis



Limited patient adherence due to pain upon inhalation and forgetfulness

Unreliable and inaccurate data because inhalations are tracked on an honor system

# Deliverables





ELECTRICAL & COMPUTER ENGINEERING



UNIVERSITY of WASHINGTON



**ADVISERS:** Christopher Neils **INDUSTRY MENTORS: Kerry Curran, Paul Horn SPONSOR: Lung Technologies** 

To wake device move it

### **Enhanced Incentive Spirometer**

### Monitoring device to be attached to the sliding rail system equipped to the front or side of the inhalation-volume chamber



# **Conclusion & Future Work**

This project was successful in iteratively prototyping an incentive spirometer reduced in size and with an ergonomic design, in addition to a low power digital patient interface that tracks patient usage of the incentive spirometer.



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