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# Respire: A Technological Tool to Navigate Mechanical Ventilation in Patient Care and Educational Settings

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# *Respire*: A Technological Tool to Navigate Mechanical Ventilation in Patient Care and Educational Settings

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## BACKGROUND

Around the world, more than 20 million patients rely on mechanical ventilators annually; however, not enough individuals understand how to operate ventilators, posing a risk to the health of many. Moreover, it is increasingly difficult to determine optimal mechanical ventilator settings in a timely fashion, especially in low-resource countries and critical care areas. To address this issue we developed *Respire*, a mobile application that bridges this gap in a twofold manner: it is designed to assist healthcare workers around the world navigate and use mechanical ventilators effectively as well as educate the general public about mechanical ventilation. Respire offers a user-friendly yet educational interface that quickly generates the most optimal ventilator settings based on the patient's age, gender, weight, and health history.

## METHODS

- Developed entirely from scratch, this application was built in Android Studio IDE utilizing the programming language Java
- The graphical user interface as well as design components were created using XML and CSS.
- The algorithm to produce optimal mechanical ventilation settings was created based on physics and physiology-based models, and disease-specific values derived from research studies
- Preliminary calculations were performed, such as determining ideal body weight (IBW), to develop the fundamental algorithm

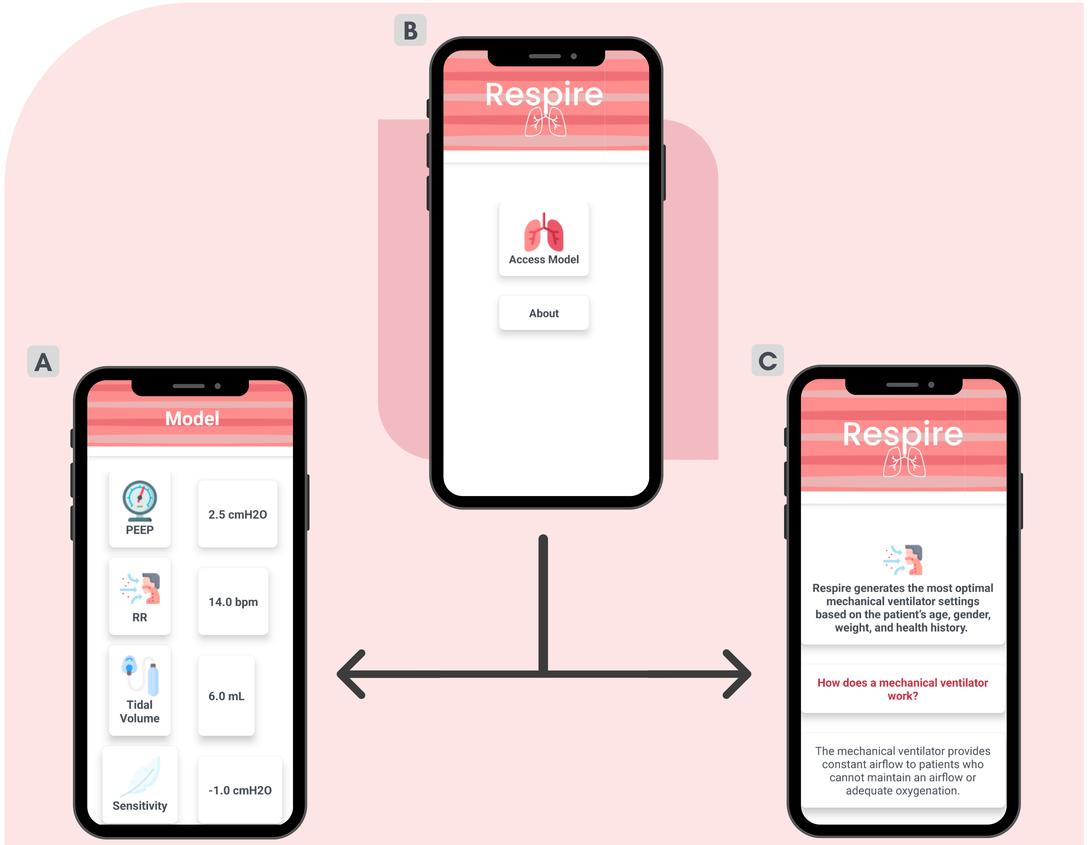


Figure A. Page of the application that displays optimal mechanical ventilation model based on user-inputted patient data; Figure B. Homepage of *Respire*; Figure C. Educational information delivery page

**D** **Mechanical Ventilation Settings Included**

Positive End-Expiratory Pressure (PEEP)
Respiratory Rate (RR)
Tidal Volume (TV)
Trigger Sensitivity (TS)

Figure D. List of settings generated by the mechanical ventilation model; currently based on patient's age, weight, and health history.

## FINDINGS

- This program provides an individualized-patient model for optimal mechanical ventilation settings, including values generated for Positive End-Expiratory Pressure (PEEP), Respiratory Rate (RR), Tidal Volume (TV), and Trigger Sensitivity (TS).
- The app offers fundamental educational information about mechanical ventilation to garner its importance in the general public and provide a simplified explanation of the optimal model's output values

## CONCLUSION

The outcomes of this program serve as an educational platform and a tool to supplement patient care related to medical respiration. *Respire* is an accessible, customizable resource that can be utilized by medical professionals to deliver optimal care to their patients as well as the general public to learn about mechanical ventilation. This product serves as a baseline to develop a more robust tool that can address the needs of healthcare workers in uplifting their practice and the health of patients.

## ACKNOWLEDEMENTS

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