**ABSTRACT**

Respiratory distress syndrome (RDS) is a lung disorder that affects the normal breathing of preterm infants by preventing their lungs from staying open leading to obstructed breathing. This disorder is responsible for much of the largely preventable preterm infant mortality in many developing countries.

The solution to this disease would be to provide the preterm babies with a constant supply of oxygen until their lungs mature enough to stay open without help. Commercial respiratory assistants are very expensive and made for first world facilities, but are being used in third world hospitals. Their combination of high cost and complexity result in the inability of local hospitals to afford or maintain them when they break. The result is less of these devices available to cater to the growing infant mortality crisis within developing countries.

In an attempt to curb the problem, a cost-effective and practical intervention would be necessary. This intervention takes the form of a completely redesigned bCPAP. This device is a respiratory device that provides the ideal mixture of oxygen and air, delivered to the delicate lungs of the baby. Therapeutic Innovations redesigns medical devices towards third world countries by removing unnecessary complex features while still maintaining reliable functionality. Part of our solution is to use pre-fabricated parts from medical suppliers and assembling them in a novel modular fashion to create our bCPAP. This removes manufacturing and approval costs, and allow us to focus on designing our product towards the conditions of third world countries.

**PRODUCT SPECIFICATIONS**

**HEAT**
- Heating blended air to target temperature
- Avoid overheating scenarios
- Minimize energy usage
- Avoid reducing unit lifetime/durability due to heat-related damage/fatigue

**HUMIDIFICATION**
- Introduce water vapor to heated gas
- Should not promote bacterial colonization
- Should not promote excessive rainout

**GAS MIXING**
- Compatible with both compressed O2 and compressed air cylinders, as well as wall supply lines
- Mix gases to physician-specified %O2/air mixture

**DELIVERY / FLOW SYSTEM**
- Regulate to starting pressure and flow rates
- Avoid overpressure scenarios
- Regulate patient pressure via bubble generator

**STRUCTURAL**
- Materials must not leak volatile toxins
- Avoid structural weakening due to continuous exposure for extended durations to elevated operating temperatures
- Must endure reasonable operating and handling hazards

**SAFETY**
- Conform to all ISO safety regulations
- Passive failsafe systems

**MARKET ANALYSIS**

- Physician and nurse surveys were conducted to compare market demand for cost-focused neonatal b-CPAP devices.
- Shows significant imbalance in physician concerns and priorities between developed and emerging markets.

**IMPACT**

Therapeutic Innovations aims to redesign medical devices for low resource areas by making them more affordable while maintaining high quality and functionality. Our bCPAP device serves to:
- Be low cost
- Easy to replace/fix broken parts
- Save lives of babies lost to RDS

Our goals moving forward are:
- Finalize a casing for the device
- Procure funding to conduct animal testing

Considering the growing number of preterm deaths per year, it has become necessary to tackle the issue through innovative means. Therapeutic Innovation aims to tackle the issue of infant mortality due to Respiratory distress syndrome by reinventing the bCPAP to be low cost yet maintain superior quality.

**REFERENCES**