

Medical Device

Continuous Negative Abdominal Pressure (CNAP) Device

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Unmet Need

Acute Respiratory Distress Syndrome (ARDS) is a life-threatening pulmonary condition affecting adults and children, with mortality exceeding **40% in severe cases** and no specific curative therapy.

Lung injury in ARDS concentrates in the dorsal (dependent) regions due to gravity and diaphragm position. Current ventilation strategies—including high PEEP and prone positioning—are limited:

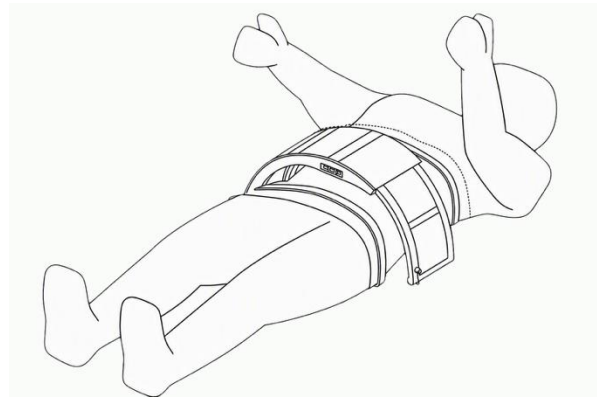
- High PEEP over-inflates healthy lung regions, increasing injury risk.
- Prone positioning is hazardous: it risks dislodging IV lines, endotracheal tubes, and monitoring catheters.
- No approved device exists that selectively recruits collapsed dorsal lung while the patient remains supine.

Target Applications

- Adult and pediatric intensive care units (ICU)
- ARDS management as adjunct or alternative to prone positioning
- Post-operative respiratory support
- Neonatal and pediatric respiratory care
- Emergency respiratory stabilization

The Technology

The CNAP device is a non-invasive, wearable external pressure system that envelops the patient's lower chest and abdomen. By applying gentle continuous sub-atmospheric (negative) pressure of **-5 to -10 cm H₂O** to the abdominal surface, it pulls the diaphragm caudally, selectively expanding the collapsed dorsal lung without over-inflating already-aerated ventral regions.



How It Works

- A rigid structural frame (flat-panel or adjustable arcuate arches) is positioned to envelop the patient's lower chest and abdomen.
- A flexible transparent sheet is wrapped around the outside of the frame, extending from the upper chest down to the thighs.
- Two sealing belts—one at the xyphoid level, one at the pelvis—form an airtight chamber between the patient and the device.
- A barb-pipe air inlet on one panel connects to standard wall suction, generating the target negative pressure inside the chamber.
- An integrated pressure sensor and display continuously monitor intra-chamber pressure in real time studies.

Keywords: Acute Respiratory Distress Syndrome (ARDS), Mechanical Ventilation, Intensive Care Unit (ICU)

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Key Advantages

- Supine compatibility: eliminates need for dangerous prone positioning, preserving patient safety and line integrity.
- Selective recruitment: targets only the dorsal atelectatic regions without over-stretching ventral lung.
- Universal sizing: scalable frame design accommodates neonates through adults.
- Low infrastructure burden: uses standard hospital wall suction — no specialized pumps or power sources required.
- Continuous monitoring: real-time pressure display enables precise, titrated therapy.
- Hemodynamic safety: no significant effect on blood pressure, pulse oximetry, heart rate, or respiratory rate observed in healthy-subject studies

Intellectual Property

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Assignee	The Hospital for Sick Children, Toronto, Canada
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Status	● Granted — Available for Licensing

The Industry, Partnership and Commercialization (IP&C) office is seeking industry partners for exclusive or non-exclusive licensing of this technology.