INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Adaptive Self-sealing Soft Robotic Face Mask with Particle Jamming

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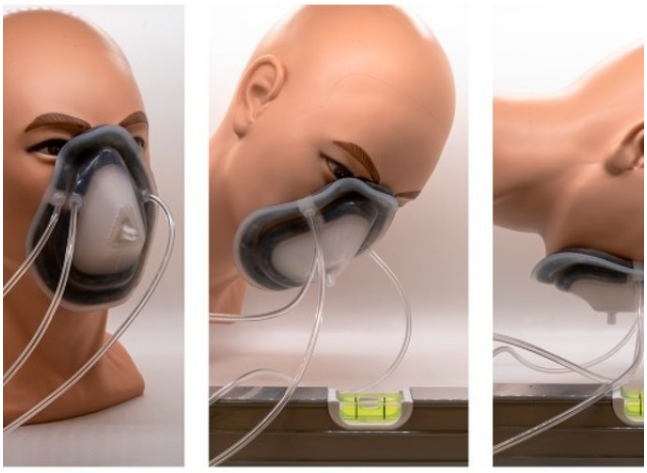

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Medical Devices
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OVERVIEW

Soft robotic mask enhances hands-free respiratory support using particle jamming technology.

- Improves sealing and reduces labor by removing manual pressure requirements
- Can be applied in a CPAP and other positive pressure airway devices, including for emergency care and surgical anesthesia

BACKGROUND

Bag valve masks (BVMs) have been indispensable in healthcare, used for over 70 years in operating rooms and emergencies like CPR. However, they require a consistent seal on the patient's face, often necessitating two healthcare providers for a proper seal. This skill-intensive process is prone to errors, especially with challenging facial anatomies or obstructions like facial hair. Even highly trained professionals find it demanding, resulting in a potential compromise in ventilation. Innovations like non-invasive ventilation with head straps or automated components have tried to address these issues but lack the BVM's versatility and present deployment challenges due to their complexity. Addressing these critical issues is essential for improving healthcare efficiency, especially during mass casualty events or in resource-limited settings where personnel might be unavailable.

INNOVATION

The developed soft robotic face mask (SRFM) represents a significant leap in ventilation technology, using particle jamming and suction to provide a reliable seal around the patient's face. This mask adapts to complex facial topologies and maintains adhesion in various conditions without manual pressure. The mask's ability to maintain a reliable seal via programmable stiffness eases the burden on healthcare providers, allowing them to focus on other critical tasks. Crafted from skin-safe silicone elastomers, it provides safe contact even with varying surface contaminants. Applications span from pre-hospital emergency care to routine surgical support, ensuring enhanced operational readiness and efficient resource allocation during large-scale emergencies. The SRFM dramatically reduces personnel demands, paving the way for more effective patient care interventions.