

Helmet-based ventilation is superior to face mask for patients with respiratory distress

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The helmet confers several advantages over the face mask. It is less likely to leak. It is more comfortable, easier to tolerate and patients can see and speak through it. Credit: The University of Chicago Medicine

A new study shows that using a transparent air-tight helmet instead of a face mask helps critically ill patients breathe better and can prevent them from needing a ventilator. Patients with helmet ventilation also spent less time in the intensive care unit and had better survival.

The study, published early online, May 15, 2016, in *JAMA*, followed 83 patients suffering from acute [respiratory distress syndrome](#) (ARDS), a severe, often lethal, injury to the lungs. ARDS causes fluid to accumulate in the lungs' microscopic air sacs. It can lead to partial collapse of the lungs, dangerously low blood-oxygen levels and death.

The subjects in this study all required mechanical breathing assistance. They were randomly assigned to receive some form of [noninvasive ventilation](#), using either a standard mask, strapped onto the face and covering the nose, mouth and chin; or the helmet, which surrounds the patient's entire head and is sealed with a soft air-tight collar that wraps around the patient's neck.

A primary goal of noninvasive ventilation is to prevent intubation, placement of a tube through the mouth or nose into the trachea to pump air into the lungs. Complications of endotracheal intubation are common. They include pneumonia, the need for strong sedatives, and delirium.

"In this group of critically ill patients, the helmet made a substantial difference," said pulmonologist John P. Kress, MD, professor of

medicine at the University of Chicago and senior author of the study. "The University's data and safety monitoring board recommended that we stop the trial early because the helmet consistently demonstrated multiple advantages, particularly the reduced need to intubate patients and longer-term reduction in mortality."

"After reviewing our data," he added, "the board felt that it would be difficult to justify enrolling more patients in the face-mask arm of the trial, which exposed them to greater risks."

The helmet "confers several advantages over the face mask," the authors wrote. It is less likely to leak. This enables the care team to increase air pressure into the helmet, which helps keep the airway and lungs open and improves oxygen levels. It is also more comfortable, easier to tolerate because it doesn't touch the face, and patients can see through it well enough to watch television, talk or read.

Patients who required the face mask for oxygenation for at least 8 hours were eligible to enroll in the study. Forty-four of the 83 patients who qualified to participate were then randomly assigned to the helmet group. The other 39 were assigned to the face-mask group.

All patients were severely ill with a 50 percent risk of requiring intubation or dying in the [intensive care unit](#). About half of the patients had weakened immune systems from cancer or transplantation.

Patients in the helmet group, however, were three times less likely to require intubation, the study's primary endpoint. Only 18.2 percent of those wearing a helmet required an endotracheal tube, versus 61.5 percent of those wearing a face mask. The helmet group had, on average, more ventilator-free days (28 vs 12.5).

Helmet patients were also more likely to survive. When compared at 90

days, 34 percent (15 patients) in the helmet group had died, compared to 56 percent (22 patients) in the [face mask](#) group.

Adverse trial-related events were minor. They included 3 skin ulcers for each group.

"The helmet interface has unique advantages and disadvantages," wrote Jeremy Beitler, MD, MPH, of the University of California, San Diego, in an accompanying editorial. "Careful selection of [patients](#) is important." This approach, he wrote, "warrants testing in a multicenter trial."

"These findings build on a shifting paradigm where less is more in the care of [critically ill patients](#)," said Bhakti Patel, MD, clinical instructor of medicine at the University and first author of the study. "We have chosen less sedation for more mental animation; less bed rest for more physical activity; and now we're choosing less intubations for more noninvasive ventilation."

More information: Bhakti K. Patel et al, Effect of Noninvasive Ventilation Delivered by Helmet vs Face Mask on the Rate of Endotracheal Intubation in Patients With Acute Respiratory Distress Syndrome, *JAMA* (2016). [DOI: 10.1001/jama.2016.6338](https://doi.org/10.1001/jama.2016.6338)

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