# NIV Interfaces, Helmets and Mask Fit

Choosing and fitting a mask, leak and rebreathing, helmet NIV and CPAP, mouthpiece ventilation, and NIV after surgery, in chest trauma and for comfort

**ICU Basics**
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## CHOOSING AN INTERFACE

| INTERFACE | USE IT FOR | WATCH FOR |
|---|---|---|
| **Oronasal mask** | First choice in acute failure, because these patients mouth-breathe | Claustrophobia, nasal bridge pressure, vomiting into the mask |
| **Nasal mask or pillows** | Alert patient with a closed mouth; claustrophobia; long-term use | Mouth leak (chin strap); not for a blocked nose |
| **Total face mask** | Nasal bridge injury, or leak that will not settle | Covers the mouth too: same vomiting risk |
| **Helmet** | Hypoxemic failure needing high PEEP for long sessions | Rebreathing, slow triggering, noise; needs its own settings |
| **Mouthpiece** | Daytime support in neuromuscular disease or cord injury | Needs lip seal and bulbar function |

**SAFETY** A patient who cannot take the mask off unaided (for example, weak arms) should not start on a mask that covers the mouth. A nasal mask, with a chin strap if needed, is safer.

## FITTING THE MASK

1. Size the mask with the maker's gauge, and let the patient hold it to the face before any strap goes on.
2. Start low (IPAP 10–12, EPAP 5–7 cm $H_2O$); reassess from 30 minutes and raise IPAP as needed.
3. Tighten the straps evenly, only until the leak is acceptable; one or two fingers should slide under a strap.
4. Make the final adjustment with the patient lying down and the pressure on.
5. Check the skin under the mask every 2–4 hours, the nasal bridge first.

**SAFETY** Do not chase a zero leak. A small leak (about 5 L/min) is negligible, and over-tightening is the common cause of nasal bridge ulcers.

## TROUBLESHOOTING

| FINDING | FIX |
|---|---|
| **Redness on the nasal bridge** | Loosen; barrier dressing; alternate masks or change to a total face mask |
| **$PaCO_2$ not falling on a single-limb circuit** | Suspect rebreathing: vented mask (port in the mask), EPAP at least 3–4 cm $H_2O$ |
| **Belching, distended abdomen** | Lower IPAP below 20 cm $H_2O$, then recheck the gas |
| **Retching or vomiting** | Mask off at once, patient upright; reassess NIV |
| **Blower stops** | Anti-asphyxia valve opens to room air; never block it |
| **Mouth leak on a nasal mask, nose clear** | Chin strap |
| **Mouth leak with a blocked nose** | Oronasal mask until the congestion clears |
| **Water in the mask and tubing (rainout)** | Turn the humidifier down; heated or insulated tubing |
| **Dry nose and mouth** | Turn the humidifier up |

## HELMET

| POINT | RULE |
|---|---|
| **Pressures** | Higher than mask settings: PEEP 10–14, pressure support 8–14 cm $H_2O$ or more |
| **Rise time** | The fastest the ventilator allows |
| **Circuit** | Double limb, one limb on each side port; no Y-piece; usually no humidifier |
| **Helmet CPAP** | Continuous fresh gas flow of at least 50 L/min, not a ventilator in CPAP mode |
| **Tidal volume** | The displayed value includes gas that inflates the hood; do not judge failure by it |
| **Leak at the collar** | Reposition or resize; do not keep tightening the armpit straps |
| **Noise, ear pressure** | Earplugs |

## BEYOND COPD AND PULMONARY EDEMA

| SITUATION | WHAT THE GUIDELINES SUGGEST |
|---|---|
| **Respiratory failure after surgery** | NIV, CPAP or bilevel, once surgical complications are addressed (ERS/ATS 2017) |
| **After surgery, by risk** | Low risk: HFNC or standard oxygen. High risk: HFNC or NIV (ERS 2022) |
| **Vomiting, ileus, bowel obstruction** | No mask NIV; HFNC needs no sealed mask |
| **Chest trauma** | Cautious NIV trial once pain is controlled; drain a pneumothorax first |
| **Terminal illness, comfort goals** | Offer NIV for dyspnea; it can spare opioid and keep the patient awake |
| **Obesity hypoventilation, still hypercapnic on CPAP** | Change to bilevel NIV and titrate |

## EXAM PEARLS

**EXAM TIP** Midface fractures: no mask NIV. Smothered feeling, alert, mouth closed: nasal mask. Stage 1 nasal bridge injury, still needs NIV: total face mask. Helmet at mask settings with rising effort: slow triggering, so raise PEEP and pressure support. Helmet CPAP with rising $PaCO_2$: more fresh gas flow. Mouthpiece ventilation: volume mode, so the patient can stack breaths.

**Sources** (31) are listed with links at icubasics.com/sheets/rt-niv-interfaces.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.