Evidence-based recommendations for preventing nosocomial transmission during respiratory care for COVID-19 patients

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Transmission of Severe Acute Respiratory Syndrome during Intubation and Mechanical Ventilation

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Nosocomial transmission of severe acute respiratory syndrome from critically ill patients to healthcare workers has been a prominent and worrisome feature of existing outbreaks. We have observed a greater risk of developing severe acute respiratory syndrome for physicians and nurses performing endotracheal intubation (relative risk [RR], 13.29; 95% confidence interval [CI], 2.99 to 59.04; p = 0.003). Nurses caring for patients receiving noninvasive positive-pressure ventilation may be at an increased risk (RR, 2.33; 95% CI, 0.25 to 21.76; p = 0.5), whereas nurses caring for patients receiving high-frequency oscillatory ventilation do not appear at an increased risk (RR, 0.74; 95% CI, 0.11 to 4.92; p = 0.6) compared with their respective reference cohorts. Specific infection control recommendations concerning the care of critically ill patients may help limit further nosocomial transmission.
Oxygen therapy

- Nasal cannula: 1-6 L/min
- High flow high humidity nasal cannula: patient with surgical mask
- Venti mask: avoid using
- Non-rebreather: Not recommended. If needed, use Y-piece with filter

Eur Respir J 2019; 53: 1802339
HFNC with surgical mask

Non-rebreather mask with filter
Noninvasive ventilation

- Mask fit is critical, if full face mask is not fit, consider using Total face mask to get sealed.
- For short-term use, use V60 and place filter between mask and expiratory port, avoid using humidification.
- For long-term use or patient complaints dry gas, use dual limb vent (PB 840 or 980) and humidification.
• Lung expansion therapy:
  – IPPB: place filter between circuit and mouthpiece/mask

• Bronchial hygiene therapy:
  – Avoid using meta-neb for airway clearance and cough-assist for airway clearance
  – Vest therapy: place surgical mask on patient’s face
  – Cornet: use T-piece and place filter at the other end of T-piece
Nebulization

• Avoid unnecessary nebulization and cough inducing aerosolized medication including hypersaline, as it is high-risk transmission procedure

• For spontaneous breathing patients
  – preferred DPI or MDI+Spacer;
  – if needed, use high flow high humidity nasal cannula to deliver aerosol and place Mesh nebulizer at the dry side of humidifier, place surgical mask on patient’s face during HFNC;
  – or for patient who can use mouthpiece and maintain mouth breathing, use one-way valve small volume neb set up to deliver aerosol

• For invasively ventilated patients: place mesh nebulizer at dry side of humidifier to deliver aerosol therapy

Chest 2009; 135: 648-654
Pharmaceutics 2019, 11, 75; doi:10.3390
Clinical Infectious Diseases® 2017;65(8):1342–8
One-way valve with small volume nebulizer set up
Bronchoscopy assist

• For spontaneous breathing patient:
  – If bronchoscope is inserted via nose, place surgical mask on patient’s face;
  – If bronchoscope is inserted via mouth with bite-block, cut a small hole on the surgical mask to fit the bronchoscope and place the surgical mask on patient’s face

• For noninvasively ventilated patients: use mask with examination port to perform bronchoscopy examination

• For invasively ventilated patients: use swivel adapter to allow bronchoscope to insert and maintain ventilation
Bronchoscope inserted via mouth

Bronchoscope inserted via nose
Intubation

• Place filter at the exhalation port of resuscitator bag
• Tight seal resuscitator mask when it is utilized
• Recommended most experienced provider perform intubation to avoid multiple attempts
• Preferred using video-laryngoscope (Glidescope)
• Place suction catheter in the ET tube with stylet and maintain continuous suctioning during intubation process, if possible
• For difficult airway, recommend using bronchoscopy to assist intubation
• Recommend sedation + paralytics during intubation, in order to reduce patient’s cough

- Am J Respir Crit Care Med Vol 169. pp 1198–1202, 2004
- SCIEntIfIC REporTs (2018) 8:198
Resuscitator bag with filter
Place suction catheter in-line with ET tube and stylet during intubation:
1. Place suction catheter in the endotracheal tube first then insert stylet
2. Maintain suctioning during intubation
Invasive ventilation

• During invasive ventilation
  – Maintain the inspiratory and expiratory filter
  – Avoid breaking circuit

• Weaning
  – Intubated patient: preferred using ventilator to perform SBT, avoid T-piece trial

• Tracheotomy patient: preferred using HME, avoid cool aerosol

• Extubation:
  – Recommended two care givers at bedside to perform this procedure: after oral suctioning, one care giver deflates cuff and loosen ETAD secure device, then extubate patient simultaneously the other care giver shuts off ventilator, pull the ET tube out with ventilator circuit and in-line suction catheter attached.
Transport of invasively ventilated patients

• Before transport, put a filter (NOT HME) at the transport vent circuit:
  – For patient whose PEEP is ≥ 12 cmH₂O: clamp the ET tube, shut off PB840 or put PB980 at standby and place a filter at the Y-piece. Then connect the transport vent circuit, immediately unclamp ET tube.
  – For patient whose PEEP is < 12 cmH₂O: shut off PB840 or put PB980 at standby. Then connect the transport vent circuit.

• When return to ICU, turn on PB840/980, then:
  – For patient whose PEEP is ≥ 12 cmH₂O: clamp the ET tube, shut off transport vent. Then connect the patient to PB840/980, immediately unclamp ET tube.
  – For patient whose PEEP is < 12 cmH₂O: shut off transport vent, then connect the patient to PB840/980.