Quality Academy Knowledge & Evidence Team

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| **Your request for evidence: ID 1908**  Can you find anything about the mortality for COVID patients who are ventilated, and also anything about methods for extubating ventilated COVID patients please? | **Date of literature search: 17/03/2020**  **Search conducted by:** Ramona Naicker  **Contact details:** [ramona.naicker@nhs.net](mailto:ramona.naicker@nhs.net) x5338 |
| **In Summary:**  **A summary updated yesterday** seems to be the best resource for your question. It notes the **limited data on efficacy and safety of ventilation in the context of viral pandemics and also gives some guidelines on extubation.**1  I’ve included 2 Wuhan-based studies, one which found that **of 32 patients who required invasive mechanical ventilation, 31 (97%) died**,2 and the other found that **30 (81%) of 37 patients requiring mechanical ventilation had died by 28 days**.3  Guidance available through JAMA Insights notes that in settings with limited access to invasive ventilation or prior to patients developing severe hypoxemic respiratory failure, there may be a role for high-flow nasal oxygen or non-invasive ventilation, **but that there are risks**.4  I’ve also included 2 pieces of correspondence which respond to recent articles regarding respiratory safety (mentioned within the literature). Admittedly I’m not sure of how relevant these are in regard to your question but thought I should include them.5,6 | |

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| **No.** | **Key information** | **Document** |
| 1. | Brewster et al., 2020. **Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group**. The Medical Journal of Australia [Preprint 17th March 2020]  Non-invasive ventilation (NIV) and High Flow Nasal Oxygen (HFNO) Therapy:  **There are limited data on the efficacy and safety of NIV and HFNO in the context of viral pandemics**. Experience with Infuenza A (H1N1) showed that NIV failed in 57-85% of patients, with failing patients having a higher ICU mortality than those treated with invasive mechanical ventilation (5)(6). **Experience with the COVID-19 patient group in Wuhan showed a similar failure rate of NIV**. Of 29 patients commenced on NIV at ICU admission, 22 (76%) went on to require invasive mechanical ventilation. The mortality rates for patients receiving NIV and invasive ventilation were strikingly similar (79% and 86% respectively) (7). **Generally, it has been suggested that NIV should be avoided**. During the SARS outbreak, there were reports of significant transmission secondary to NIV (8). Not only does NIV present a higher risk of spread through mask leak, it can lead to delayed and expeditious tracheal intubation, which can increase risks to staff who more hurriedly prepare their PPE (8).  Extubation practices:  **Generic guidelines exist for extubation. These should be followed where they don’t conflict with the special considerations for extubation of the COVID-19 patient group outlined below**. Patients should ideally be non-infective prior to extubation but this is likely to be unfeasible as resources are drained. Where this is achievable, however, standard extubation procedures apply. In situations where a patient is still at risk of viral transmission, the following recommendations should be observed:   * **Patients should ideally be ready for extubation onto facemask.** * **NIV and HFNO should be avoided where possible.** * **Two staff members should perform extubation.** * **The same level of PPE should be worn for extubation as is worn by the Airway Operator, Airway Assistant and Team Leader during intubation.** * **The patient should not be encouraged to cough.** * **A simple oxygen mask should be placed on the patient immediately post extubation to minimise aerosolization from coughing.** * **Oral suctioning may be performed, with care taken not to precipitate coughing.**   5. Kumar et al., 2009. for the Canadian Critical Care Trials Group H1N1 Collaborative**. Critically Ill Patients With 2009 Influenza A (H1N1) Infection in Canada**. *JAMA*; 302(17): 1872-9.  6. Rodríguez et al., 2017. **Risk Factors for Non-invasive Ventilation Failure in Critically Ill Subjects With Confirmed Influenza Infection**. *Respiratory Care*; 62 (10): 1307-15.  7. Yang et al., 2020. **Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study**. *Lancet Respir Med*; (published online Feb 21. 2020)  8. Wax, 2020. **Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients**. *Can J Anesth/J Can Anesth*. | Available to read online [here](https://www.mja.com.au/journal/2020/212/10/consensus-statement-safe-airway-society-principles-airway-management-and#panel-article) |
| 2. | Zhou et al., 2020. **Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study**. *The Lancet* (published online March 9. 2020).  **Key finding:**   * **Older age, showing signs of sepsis on admission, underlying diseases like high blood pressure and diabetes, and the prolonged use of non-invasive ventilation were important factors in the deaths of these patients. 32 patients required invasive mechanical ventilation, of whom 31 (97%) died.**   Data comprised of:   * Retrospective, multicentre cohort study including 191 patients, Wuhan. * This is the largest retrospective cohort study among patients with COVID-19 who have experienced a definite outcome   The median time from illness onset to invasive mechanical ventilation was 14·5 days (12·0–19·0). Extracorporeal membrane oxygenation was used in three patients, none of whom survived. Sepsis was the most frequently observed complication, followed by respiratory failure, ARDS, heart failure, and septic shock (table below). Half of non-survivors experienced a secondary infection, and ventilator-associated pneumonia occurred in ten (31%) of 32 patients requiring invasive mechanical ventilation. The frequency of complications were higher in non-survivors than survivors.  Limitations:   * Due to the retrospective study design, not all laboratory tests were done in all patients, including lactate dehydrogenase, IL-6, and serum ferritin. Therefore, their role might be underestimated in predicting in-hospital death. * Patients were sometimes transferred late in their illness to the two included hospitals. Lack of effective antivirals, inadequate adherence to standard supportive therapy, and high-dose corticosteroid use might have also contributed to the poor clinical outcomes in some patients. * The estimated duration of viral shedding is limited by the frequency of respiratory specimen collection, lack of quantitative viral RNA detection, and relatively low positive rate of SARS-CoV-2 RNA detection in throatswabs. * By excluding patients still in hospital as of Jan 31, 2020, and thus relatively more severe disease at an earlier stage, the case fatality ratio in this study cannot reflect the true mortality of COVID-19. * Interpretation of findings might be limited by the sample size. | Available to read online [here](https://www.thelancet.com/pb-assets/Lancet/pdfs/S014067362305663.pdf) |
| 3. | Yang et al., 2020. **Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study**. *Lancet Respir Med*; (published online Feb 21. 2020).  **Key finding:**   * **30 (81%) of 37 patients requiring mechanical ventilation had died by 28 days.**   Data comprised of:   * Single-centered, retrospective, observational study including 52 critically ill adult patients with SARS-CoV-2 pneumonia, Wuhan   **Compared with survivors, non-survivors were older, more likely to develop ARDS, and more likely to receive mechanical ventilation either invasively or non-invasively. 30 (81%) of 37 patients requiring mechanical ventilation had died by 28 days.**  33 (63·5%) patients were treated with high-flow nasal cannula, 37 (71%) with mechanical ventilation, six (11·5%) with prone position ventilation, six (11·5%) with extracorporeal membrane oxygenation (ECMO), nine (17%) with renal replacement therapy, and 18 (35%) with vasoconstrictive agents.  Of the 20 patients who survived, eight patients were discharged. Three patients were still on invasive ventilation at 28 days, including one patient who was also on ECMO. One patient was on non-invasive ventilation, two were using high-flow nasal cannula, and six were using common nasal cannula.  Limitations:   * **Only 52 critically ill patients were included.** * **Some specific information from the ICU was missing, such as mechanical ventilation settings.** * **This is a retrospective study. The data in this study permit a preliminary assessment of the clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia. Further studies are still needed.** | Available to read online [here](https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30079-5/fulltext) |
| 4. | Murthy et al., 2020. **Care for Critically Ill Patients With COVID-19**. *JAMA* [published online March 11th 2020]  Clinical Management and Outcomes  **In settings with limited access to invasive ventilation or prior to patients developing severe hypoxemic respiratory failure, there may be a role for high-flow nasal oxygen or non-invasive ventilation**. However, the high gas flow of these 2 techniques is less contained than in the closed circuitry typical of invasive ventilators, which poses the risk of dispersion of aerosolized virus in the health care environment, such as in the setting of a poorly fitting face mask. Determining the magnitude of this risk, and mitigation strategies, is a crucial knowledge gap. | Available to read online [here](https://jamanetwork.com/journals/jama/fullarticle/2762996) |
| 5. | Aminnejad et al., 2020. **Lidocaine during intubation and extubation in patients with coronavirus disease (COVID-19).** *Canadian Journal of Anesthesia.* [Correspondence; Published 16th March 2020].   * **This correspondence is in response to** [**Wax et al., 2020**](https://link.springer.com/article/10.1007%2Fs12630-020-01591-x)**. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients.**   Cough is a common event following premedication with an opioid such as fentanyl (given prior to induction of anesthesia) and can be prevented by a single intravenous dose of lidocaine. One of the reasons complete muscle relaxation during endotracheal intubation in coronavirus disease (COVID-19) patients is recommended is to reduce coughing. In addition, **coughing and bucking are also prevalent events during extubation**. Emergence coughing is a challenging issue and a variety of medications have been proposed to prevent it. Again, **administration of intravenous lidocaine (which is readily available) prior to tracheal extubation can effectively reduce emergence coughing without any other significant side-effects**. Consideration should be given to injections of lidocaine at the beginning and the end of any procedure requiring intubation and/or extubation in patients with COVID-19. | Available to read online [here](https://link.springer.com/article/10.1007/s12630-020-01627-2) |
| 6. | Ñamendys-Silva, 2020. **Respiratory support for patients with COVID-19 infection.** *The Lancet* [Correspondence; Published March 5th 2020]   * **Correspondence in response to numerous articles regarding respiratory safety including above-included Yang et al.3**   The fundamental pathophysiology of severe viral pneumonia is acute respiratory distress syndrome (ARDS). **Non-invasive ventilation is not recommended for patients with viral infections complicated by pneumonia** because, although non-invasive ventilation temporarily improves oxygenation and reduces the work of breathing in these patients, this method does not necessarily change the natural disease course.  **The application of non-invasive ventilation in patients with COVID-19 in the ICU is controversial**. Considering the above factors, clinicians might not use non-invasive ventilation for critically ill patients with ARDS due to COVID-19 until further data from the COVID-19 epidemic are available. | Available to read online [here](https://www.thelancet.com/action/showPdf?pii=S2213-2600%2820%2930110-7) |