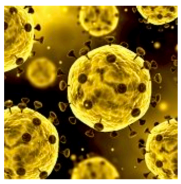
Cochrane Special Collections

Coronavirus (COVID-19): evidence relevant to critical care

27 March 2020



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This Special Collection is one of two collections on COVID-19, and it focuses on evidence relevant to critical care. See also the companion Special Collection: ***Coronavirus (COVID-19): infection control and prevention measures****.*

It is also available in ***Simplified Chinese****,* ***German****,* ***Farsi****,* ***French****,* ***Japanese****,* ***Bahasa Malaysia****,* ***Polish****,* ***Portuguese****,* ***Russian****, and* ***Spanish****.*

This Special Collection has been created in response to the COVID-19 pandemic, and is regularly updated. It aims to ensure immediate access to systematic reviews most directly relevant to the management of people hospitalized with severe acute respiratory infections. It includes reviews that are relevant to the **WHO interim guidance**, those identified as relevant by **Cochrane Acute and Emergency Care**, and also draws on the knowledge of Cochrane groups in affected regions.

While the reviews in this Special Collection assess interventions that are referenced in the WHO interim guidance, the direct applicability of the evidence may be limited by the low proportion of people with viral infection enrolled in the primary studies.

This Special Collection includes Cochrane Reviews on the following topics: **fluid and vasopressor therapy**; **respiratory support and mechanical ventilation**; **weaning mechanical ventilation**; **managing hypoxaemia**; **pharmacological treatment**; and **nutrition in intensive care**. Many reviews in the collection have associated **Cochrane Clinical Answers**, with links provided.

It is important to note that the reviews included in this Collection summarise evidence; their inclusion does not mean that they are an effective treatment. A number of reviews presented here highlight the paucity of high-quality evidence to inform medical decision-making in the context of the severe acute respiratory infection (SARI) crisis.

Fluid and vasopressor therapy

Initial resuscitation for hypotension typically includes administration of intravenous fluids, followed by initiation of vasopressors when hypotension persists.

Liberal versus conservative fluid therapy in adults and children with sepsis or septic shock

Free access

Sepsis and septic shock are potentially life-threatening complications of infection that are associated with high morbidity and mortality in adults and children. Fluid therapy is regarded as crucial during initial treatment of sepsis, but it is unclear whether conservative or liberal fluid therapy can improve clinical outcomes in patients with sepsis. This review determines whether liberal versus conservative fluid therapy improves clinical outcomes in adults and children with initial sepsis and septic shock. *Associated Cochrane Clinical Answer*: **For children with sepsis or septic shock, how does liberal fluid therapy compare with conservative fluid therapy?**

Colloids versus crystalloids for fluid resuscitation in critically ill people

Free access

Critically ill people may lose fluid because of serious conditions, infections (e.g. sepsis), trauma, or burns, and need additional fluids urgently to prevent dehydration or kidney failure. Colloid or crystalloid solutions may be used for this purpose. Crystalloids have small molecules, are inexpensive, easy to use but may increase oedema. Colloids have larger molecules, cost more, and may provide swifter volume expansion in the intravascular space, but may induce allergic reactions, blood clotting disorders, and kidney failure. This review assesses the effect of using colloids versus crystalloids in critically ill people requiring fluid volume replacement on mortality, need for blood transfusion or renal replacement therapy, and adverse events. *Associated Cochrane Clinical Answer*: **How do colloids compare with crystalloids for fluid resuscitation in critically ill people?**

Buffered solutions versus 0.9% saline for resuscitation in critically ill adults and children

Free access

Among crystalloid solutions, 0.9% saline is the most commonly administered. Buffered solutions may offer some theoretical advantages (less metabolic acidosis, less electrolyte disturbance), but the clinical relevance of these remains unknown. This review assesses the effects of buffered solutions versus 0.9% saline for resuscitation in critically ill adults and children. *Associated Cochrane Clinical Answer*: **How do buffered solutions compare with 0.9% saline for critically ill people requiring intravenous fluid therapy?**

Vasopressors for hypotensive shock

Free access

Despite obvious immediate effects of vasopressors on haemodynamics, their effect on patient-relevant outcomes remains controversial. This review aims to compare the effect of one vasopressor regimen (vasopressor alone, or in combination) versus another vasopressor regimen on mortality in critically ill participants with shock. *Associated Cochrane Clinical Answer*: **How does norepinephrine compare with other vasopressors in people with hypotensive shock?**

Respiratory support and mechanical ventilation

Patients with severe acute respiratory infection may require supplemental oxygen and mechanical ventilatory support.

High-flow nasal cannulae for respiratory support in adult intensive care patients

Free access

High-flow nasal cannulae (HFNC) deliver high flows of blended humidified air and oxygen via wide-bore nasal cannulae and may be useful in providing respiratory support for adult patients experiencing acute respiratory failure in the intensive care unit (ICU). This review assesses the safety and efficacy of HFNC versus comparator interventions in terms of treatment failure, mortality, adverse events, duration of respiratory support, hospital and ICU length of stay, respiratory effects, patient-reported outcomes, and costs of treatment. *Associated Cochrane Clinical Answer*: **How does a high-flow nasal cannula compare with low-flow oxygen for adults in intensive care requiring respiratory support?**

Airway physical examination tests for detection of difficult airway management in apparently normal adult patients

Free access

Unsuccessful management of the airway is associated with serious morbidity and mortality. The four descriptors of the difficult airway are: difficult face mask ventilation, difficult laryngoscopy, difficult tracheal intubation, and failed intubation. Several bedside screening tests are used in clinical practice to identify those at high risk of a difficult airway, although their accuracy and benefit remains unclear. This review characterizes and compares the diagnostic accuracy of the Mallampati classification and other commonly used airway examination tests for assessing the physical status of the airway in adult patients with no apparent anatomical airway abnormalities.

Recruitment manoeuvres for adults with acute respiratory distress syndrome receiving mechanical ventilation

Free access

Recruitment manoeuvres involve transient elevations in airway pressure applied during mechanical ventilation to open ('recruit') collapsed lung units and increase the number of alveoli participating in tidal ventilation. They are often used to treat patients in intensive care who have acute respiratory distress syndrome (ARDS), but the effect of this treatment on clinical outcomes has not been well established. This review aims to determine the effects of recruitment manoeuvres on mortality in adults with acute respiratory distress syndrome as well as the effects of recruitment manoeuvres on oxygenation and adverse events (e.g. rate of barotrauma). *Associated Cochrane Clinical Answer*: **What are the effects of recruitment maneuvers for adults with acute respiratory distress syndrome receiving mechanical ventilation?**

Semi-recumbent position versus supine position for the prevention of ventilator-associated pneumonia in adults requiring mechanical ventilation

Free access

Ventilator-associated pneumonia (VAP) is associated with increased mortality, a prolonged hospital stay, and increased healthcare costs in critically ill patients. Guidelines recommend a semi-recumbent position (30° to 45°) for preventing VAP among patients requiring mechanical ventilation. However, due to methodological limitations in existing systematic reviews, uncertainty remains regarding the benefits and harms of the semi-recumbent position for preventing VAP. This review assesses the effectiveness and safety of semi-recumbent positioning versus supine positioning to prevent VAP in adults requiring mechanical ventilation. *Associated Cochrane Clinical Answer*: **How does a semi-recumbent position compare with a supine position in adults requiring mechanical ventilation?**

Pressure-controlled versus volume-controlled ventilation for acute respiratory failure due to acute lung injury (ALI) or acute respiratory distress syndrome (ARDS)

Free access

Acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) account for one-quarter of cases of acute respiratory failure in intensive care units (ICUs). Mechanical ventilation of people with ALI/ARDS allows time for the lungs to heal, but ventilation is invasive and can result in lung injury. It is uncertain whether ventilator-related injury would be reduced if pressure delivered by the ventilator with each breath is controlled, or whether the volume of air delivered by each breath is limited. This review compares pressure-controlled ventilation versus volume-controlled ventilation in adults with ALI/ARDS to determine whether pressure-controlled ventilation reduces in-hospital mortality and morbidity in intubated and ventilated adults. *Associated Cochrane Clinical Answer*: **How do pressure and volume-controlled ventilation compare in people with acute respiratory failure or distress syndrome?**

High versus low positive end-expiratory pressure (PEEP) levels for mechanically ventilated adult patients with acute lung injury and acute respiratory distress syndrome

Free access

Mortality in patients with acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) remains high. These patients require mechanical ventilation, but this has been associated with ventilator-induced lung injury. High levels of positive end-expiratory pressure (PEEP) could reduce this condition and improve patient survival. This review assesses the benefits and harms of high versus low levels of PEEP in patients with ALI and ARDS.

Lung protective ventilation strategy for the acute respiratory distress syndrome

Free access

Acute respiratory distress syndrome and acute lung injury can be further complicated by ventilator-induced lung injury. Lung protective ventilation strategies may lead to improved survival. This review assesses the effects of ventilation with lower tidal volume on morbidity and mortality in patients aged 16 years or older affected by acute respiratory distress syndrome and acute lung injury. It also determines whether the comparison between low and conventional tidal volume was different if a plateau airway pressure of greater than 30 to 35 cm H_20 was used.

Daily sedation interruption versus no daily sedation interruption for critically ill adult patients requiring invasive mechanical ventilation

Free access

Daily sedation interruption (DSI) is thought to limit drug bioaccumulation, promote a more awake state, and thereby reduce the duration of mechanical ventilation. Available evidence has shown DSI to either reduce, not alter, or prolong the duration of mechanical ventilation. This review aims to compare the total duration of invasive mechanical ventilation for critically ill adult patients requiring intravenous sedation who were managed with DSI versus those with no DSI. And also, to determine whether DSI influenced mortality, intensive care unit (ICU) and hospital lengths of stay, adverse events, the total doses of sedative drug administered, and quality of life. *Associated Cochrane Clinical Answer*: **How does interruption of daily sedation compare with no interruption for critically ill adults requiring invasive mechanical ventilation?**

Weaning mechanical ventilation

Reducing weaning time is desirable in minimizing potential complications from mechanical ventilation.

Factors that impact on the use of mechanical ventilation weaning protocols in critically ill adults and children: a qualitative evidence-synthesis

Free access

Methods to improve ventilator weaning processes are needed because prolonged mechanical ventilation is associated with a longer intensive care unit length of stay and higher mortality. Growing awareness of the benefits of understanding the contextual factors impacting on effectiveness has encouraged the integration of qualitative evidence syntheses with effectiveness reviews. This review aimed to investigate the factors influencing how healthcare professionals use protocols to wean adults and children from mechanical ventilation.

Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients

Free access

Standardized weaning protocols are supposed to reduce time spent on mechanical ventilation. However, evidence supporting their use in clinical practice is inconsistent. This review compares the total duration of mechanical ventilation of critically ill adults who were weaned using protocols versus usual (non-protocolized) practice. It also determined differences between protocolized and non-protocolized weaning in outcomes measuring weaning duration, harm (adverse events) and resource use (intensive care unit and hospital length of stay. *Associated Cochrane Clinical Answer*: **How does protocolized compare with non-protocolized weaning off mechanical ventilation for critically ill adults?**

Noninvasive positive-pressure ventilation as a weaning strategy for intubated adults with respiratory failure

Free access

Noninvasive positive-pressure ventilation (NPPV) provides ventilatory support without the need for an invasive airway. Interest has emerged in using NPPV to facilitate earlier removal of an endotracheal tube and to decrease complications associated with prolonged intubation. This review determined whether the NPPV strategy reduced all-cause mortality compared with invasive positive-pressure ventilation weaning. It also determined differences between strategies in proportions of weaning failure and ventilator-associated pneumonia, intensive care unit and hospital length of stay, total duration of mechanical ventilation, duration of mechanical support related to weaning, duration of endotracheal mechanical ventilation, frequency of adverse events (related to weaning) and overall quality of life.

Managing hypoxaemia

Acute or chronic hypoxaemia is a common reason for admission to intensive care and for provision of mechanical ventilation. Various refinements of mechanical ventilation or adjuncts are employed to improve patient outcomes.

Higher versus lower fraction of inspired oxygen or targets of arterial oxygenation for adults admitted to the intensive care unit

Free access

The mainstay treatment for hypoxaemia is oxygen therapy, which is given to most adults admitted to the intensive care unit. Oxygen administration has been liberal, which may result in hyperoxaemia. Some studies have indicated an association between hyperoxaemia and mortality, whilst other studies have not. Oxygen administration is widely recommended in international clinical practice guidelines, despite a lack of robust evidence. The potential benefit of supplemental oxygen must be weighed against the potentially harmful effects of hyperoxaemia, and this review assesses the benefits and harms of higher versus lower fraction of inspired oxygen or targets of arterial oxygenation for adults admitted to the intensive care unit. *Associated Cochrane Clinical Answer*: **For adults admitted to the intensive care unit (ICU), how do different oxygenation levels compare?**

Prone position for acute respiratory failure in adults

Free access

Mortality from acute respiratory distress syndrome, one of the main contributors to the need for mechanical ventilation for hypoxaemia, remains approximately 40%. Ventilation in the prone position may improve lung mechanics and gas exchange and could improve outcomes. This review determines whether prone ventilation offers a mortality advantage when compared with traditional supine or semi recumbent ventilation in patients with severe acute respiratory failure requiring conventional invasive artificial ventilation. *Associated Cochrane Clinical Answer*: **How does prone positioning compare with supine positioning for ventilation in adults with severe acute respiratory failure?**

Extracorporeal membrane oxygenation for critically ill adults

Free access

Extracorporeal membrane oxygenation (ECMO) is a form of life support that targets the heart and lungs, but its use is associated with several risks. ECMO for severe respiratory failure accesses and returns blood from the venous system and provides non-pulmonary gas exchange. Patient-related adverse events include haemorrhage or extremity ischaemia; circuit-related adverse effects may include pump failure, oxygenator failure and thrombus formation. This review aims to determine whether use of veno-venous or venous-arterial ECMO in adults is more effective in improving survival compared with conventional respiratory and cardiac support.

Pharmacological treatment

Although fluid resuscitation and ventilatory support are the mainstays of treatment for patients with SARI requiring critical care, various pharmacological interventions have been suggested, yet the benefits and harms remain uncertain.

Pharmacological agents for adults with acute respiratory distress syndrome

Free access

Acute respiratory distress syndrome (ARDS) is a life-threatening condition caused by direct or indirect injury to the lungs. This review evaluates the effectiveness of

pharmacological agents in adults with ARDS on mortality, mechanical ventilation, and fitness to return to work at 12 months. *Associated Cochrane Clinical Answer*: **What are the effects of pharmacological agents for adults with acute respiratory distress syndrome (ARDS)?**

Corticosteroids as adjunctive therapy in the treatment of influenza

Free access

Corticosteroids show evidence of benefit in sepsis and related conditions, most likely due to their anti-inflammatory and immunomodulatory properties. Although commonly prescribed for severe influenza, there is uncertainty over their potential benefits or harms. This review aims to assess the effectiveness and potential adverse effects of corticosteroids as adjunctive therapy in the treatment of influenza, considering differences in timing and doses of corticosteroids. *Associated Cochrane Clinical Answer*: **For adults with influenza admitted to hospital, what are the effects of corticosteroids given to relieve symptoms associated with severe influenza?**

Immunonutrition for acute respiratory distress syndrome (ARDS) in adults

Free access

Acute respiratory distress syndrome (ARDS) is an overwhelming systemic inflammatory process associated with significant morbidity and mortality. Pharmacotherapies that moderate inflammation in ARDS are lacking. Several trials have evaluated the effects of pharmaconutrients, given as part of a feeding formula or as a nutritional supplement, on clinical outcomes in critical illness and ARDS. This review critically appraises available evidence on the effects of immunonutrition compared to standard non-immunonutrition formula feeding on mechanically ventilated adults with ARDS. *Associated Cochrane Clinical Answer*: **For adults with acute respiratory distress syndrome (ARDS) who are mechanically ventilated, how does immunonutrition compare with standard formula feeding?**

Short-course versus prolonged-course antibiotic therapy for hospital-acquired pneumonia in critically ill adults

Free access

Pneumonia is the most common hospital-acquired infection affecting patients in the intensive care unit. However, current national guidelines for the treatment of hospital-acquired pneumonia (HAP) are several years old and the diagnosis of pneumonia in mechanically ventilated patients (VAP) has been subject to considerable recent attention. The optimal duration of antibiotic therapy for HAP in the critically ill is uncertain. This review assesses the effectiveness of short versus prolonged-course antibiotics for HAP in critically ill adults, including patients with VAP. *Associated Cochrane Clinical Answer*: **Which regimen is most effective at improving outcomes in critically ill adults with hospital-acquired pneumonia: short-course or prolonged-course antibiotic therapy?**

Antibiotics for community-acquired pneumonia in children

Free access

Pneumonia caused by bacterial pathogens is the leading cause of mortality in children in low-income countries. Early administration of antibiotics improves outcomes. This review aims to identify effective antibiotic drug therapies for community-acquired pneumonia of varying severity in children by comparing various antibiotics. *Associated Cochrane Clinical Answers*: **In children admitted to hospital with community-acquired pneumonia, how do different antibiotics compare with each other?** And **In children with community-acquired pneumonia in the ambulatory setting, what are the effects of oral antibiotics?**

Empiric antibiotic coverage of atypical pathogens for community-acquired pneumonia in hospitalized adults

Free access

Community-acquired pneumonia (CAP) is caused by various pathogens, traditionally divided into 'typical' and 'atypical'. Initial antibiotic treatment of CAP is usually empirical, customarily covering both typical and atypical pathogens. This review aims to estimate the mortality and proportion with treatment failure using regimens containing atypical antibiotic coverage, compared with those that had typical coverage only. *Associated Cochrane Clinical Answer*: **In hospitalized adults with community-acquired pneumonia, is there randomized controlled trial evidence to support the use of empiric atypical antibiotic coverage over typical antibiotic coverage?**

Chinese herbs combined with Western medicine for severe acute respiratory syndrome (SARS)

Free access

Severe acute respiratory syndrome (SARS) is an acute respiratory disease caused by a novel coronavirus, which first appeared in Foshan City, China on 22 December 2002. Chinese herbs were used in its treatment. This review evaluates the possible effectiveness and safety of Chinese herbs, combined with Western medicines versus Western medicines alone for SARS patients.

Managing delirium

Delirium is defined as a disturbance in attention, awareness, and cognition, with reduced ability to direct, focus, sustain, and shift attention, and reduced orientation to the environment.

Pharmacological interventions for the treatment of delirium in critically ill adults

Free access

Delirium is typically an acute reversible cognitive impairment, and its presence is associated with devastating impact on both short-term and long-term outcomes for critically ill patients. Considerable uncertainty surrounds the relative benefits and safety of available pharmacological interventions for this population. This review assesses the effects of pharmacological interventions for treatment of delirium on duration of delirium in critically ill adults with confirmed or documented high risk of delirium. *Associated Cochrane Clinical Answer*: **What are the benefits and harms of pharmacological interventions for treating critically ill adults with delirium?**

Interventions for preventing intensive care unit delirium in adults

Free access

Critically ill patients in the intensive care unit (ICU) frequently develop ICU delirium. It can profoundly affect them and their families because it is associated with increased mortality, longer duration of mechanical ventilation, longer hospital and ICU stay, and long-term cognitive impairment. This review assesses existing evidence for the effect of preventive interventions on ICU delirium, in-hospital mortality, the number of delirium- and coma-free days, ventilator-free days, length of stay in the ICU and cognitive impairment. *Associated Cochrane Clinical Answer*: **How does haloperidol compare with placebo for preventing delirium in critically ill adults in intensive care?**

Nutrition in intensive care

Critically ill people are at increased risk of malnutrition. Acute and chronic illness, trauma and inflammation induce stress-related catabolism, and drug-induced adverse effects may reduce appetite or increase nausea and vomiting. In addition, patient management in the intensive care unit (ICU) may also interrupt feeding routines.

Enteral versus parenteral nutrition and enteral versus a combination of enteral and parenteral nutrition for adults in the intensive care unit

Free access

Methods to deliver nutritional requirements include provision of enteral nutrition (EN), or parenteral nutrition (PN), or a combination of both. However, each method is problematic. This review aims to determine the route of delivery that optimizes uptake of nutrition. It compares the effects of EN versus PN, and the effects of EN versus a combination of EN and PN among critically ill adults, in terms of mortality, number of ICU-free days, and adverse events. *Associated Cochrane Clinical Answer*: **How does enteral nutrition compare with parenteral nutrition (with or without enteral nutrition) for adults admitted to the intensive care unit (ICU)?**

Acknowledgements

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