End-of-life care in patients with a highly transmissible respiratory virus: implications for COVID-19
Soins de fin de vie pour les patients atteints d’un virus respiratoire extrêmement transmissible : implications pour la COVID-19

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Abstract Symptom management and end-of-life care are core skills for all physicians, although in ordinary times many anesthesiologists have fewer occasions to use these skills. The current coronavirus disease (COVID-19) pandemic has caused significant mortality over a short time and has necessitated an increase in provision of both critical care and palliative care. For anesthesiologists deployed to units caring for patients with COVID-19, this narrative review provides guidance on conducting goals of care discussions, withdrawing life-sustaining measures, and managing distressing symptoms.

Résumé La prise en charge des symptômes et les soins de fin de vie sont des compétences de base pour tous les médecins, bien qu’en temps ordinaire, de nombreux anesthésiologistes n’ont que peu d’occasions de mettre en pratique ces compétences. La pandémie actuelle de coronavirus 2019 (COVID-19) a provoqué un taux de mortalité significatif dans un court intervalle et a nécessité une augmentation des besoins en soins intensifs et en soins palliatifs. Destiné aux anesthésiologistes déployés dans les unités prenant soin de patients atteints de la COVID-19, ce compte rendu narratif offre des recommandations quant à la façon de mener les discussions à propos des objectifs de soins, du retrait des thérapies de soutien vital, et de la prise en charge de symptômes de détresse.

Cases of coronavirus disease (COVID-19) were first reported in December 2019 in Hubei province in China and the illness has rapidly spread worldwide. Since its first appearance, COVID-19 has proven to be a deadly disease, particularly in specific patient groups, carrying mortality rates up to 14.8% in the elderly and even higher in those with serious co-existing morbidities and other frailties.

Much attention has been paid to the need for critical care resources to support patients infected with COVID-19. Less discussed, but equally important, is the need for intensive palliative care resources to ensure symptom management and comfort for those people dying of COVID-19. In Canada, anesthesiologists deployed to critical care units will require enhanced skills in discussing goals of care, managing symptoms in the dying patient, and withdrawing life-sustaining measures.
Establishing goals of care

Establishing goals of care may present increased challenges in the context of a pandemic. Limitations imposed by isolation to limit infection transmission, personal protective equipment (PPE), and restriction of visitors may impact the communication skills that we are all accustomed to using and may lead to pressures that can impact goals of care discussions.3

In recent years, there has been considerable work on developing frameworks for discussing goals of care. The following frameworks share similar principles, and remain valid and unchanged in the setting of COVID-194,5:

1. Establish a therapeutic relationship;
2. Assess acute medical illness, baseline health (underlying conditions, frailty), and the patient’s values and goals;
3. Assess decision-making capacity and identify a substitute decision-maker if necessary;
4. Explain and discuss options with the patient or patient’s substitute decision-maker;
5. Recommend a plan of treatment and seek consent.

Therapeutic relationships are central to effective communication and decision-making in medicine.6 External limitations may alter how we relate to patients and their families. It is helpful to return to basic principles. Self-awareness, a basic assessment of the situation and key stakeholders, takes only moments and provides a foundation for the interaction.7–11 Attention to setting, privacy, comfort, and introduction of and opportunities for empathy and education contribute to establishing trust, rapport, and dialogue.12–17

Critically ill patients are at risk of adverse outcomes including significant rates of disability and death. Validated acute illness and organ dysfunction scores may help clinicians quantify this risk in general but should be used with caution when communicating the prognosis for any individual patient.18,19 Early experience in COVID-19 suggests that older patients with pre-existing conditions such as diabetes and hypertension have a significantly increased mortality risk.20 Pre-existing frailty also increases in-hospital mortality, 12-month mortality, difficulty in weaning from mechanical ventilation, and degree of resultant disability in all critically ill patients.21–24

It is important to discuss prognosis with the patient in a way that ties into their core values. While some patients may value longevity, many prioritize other qualitative aspects of life such as independence, enjoyment of life, awareness, and the ability to interact with loved ones. Canadian research suggests that prognostication on recovery has an important impact on patients’ decisions about pursuit of life support interventions.5,25 Integrating the biomedical information and prognosis with the patient’s values to form a recommended treatment plan is a core skill for consultants working with critically ill patients. Many critically ill patients will lack capacity to consent to medical treatment plans because of their illness and/or the treatments that they require. Canadian physicians working in critical care environments should familiarize themselves with provincial guidelines for capacity assessment and determination of the appropriate substitute decision-maker.3,26,27

Standards of withdrawal of life support in a critical care setting

In 2016, the Canadian Critical Care Society (CCCS) endorsed guidelines for the WLSM published by Downar et al.28 The guidelines divide WLSM into four broad categories: 1) preparing for WLSM; 2) assessment of distress; 3) pharmacologic management of distress; and 4) discontinuation of life-sustaining measures and monitoring.28 Most of the guidance provided in the CCCS document remains applicable for patients with COVID-19, with some notable exceptions, as highlighted below.

Many institutions have introduced coronavirus-related restrictions on the number and timing of friends and family visiting patients in hospital. Preparing and supporting patients and their families around the time of death presents particular challenges. Compounding these challenges, family members themselves might be suffering from COVID-19 and could also have recently lost another loved one to the virus. Meetings between staff and family and between patients and their caregivers may need to occur remotely by phone or videoconference, which may seem foreign and impersonal. Video chat might also be impractical for those without access to or familiarity in using the technology. For family members with hearing impairment, it may be difficult to accurately receive information over the phone or via video chat. Additionally, privacy concerns related to certain virtual communication platforms may introduce further restrictions29 and clinicians should refer to advice from national bodies such as the Canadian Medical Protective Association in conducting virtual communication.30

Human and physical resources may also be overburdened. Provider-to-patient care ratios may be higher, and direct patient contact limited to reduce
infection exposure and conserve PPE. Infected patients may be isolated or cohorted, limiting the ability to move any single patient to an ideal setting for palliation. Some healthcare workers may be reassigned to less familiar roles. Recent publications on end-of-life care of patients with COVID-19 have encouraged augmentation of education for frontline staff on symptom assessment and palliative management. Validated symptom assessment tools can help guide these assessments. While there are a range of presentations of COVID-19 ranging from arrhythmias to thrombosis, severe COVID-19 has presented predominantly as a respiratory disease, and providers caring for patients dying in this context should be particularly adept in the assessment and management of dyspnea.

Suggestions regarding the logistics of WLSM are also contained in recently published Canadian guidelines. The discontinuation of mechanical ventilation is a specific concern for patients dying with a highly transmissible respiratory virus. As above, clinicians should pay particular attention to the assessment and treatment of respiratory distress while ventilatory support is withdrawn. Extubation, as recommended in the 2016 CCCS guidelines, is a potentially aerosol-generating medical procedure (AGMP). Local protocols that include palliation without extubation, or extubation with protection to manage AGMP (PPE, use of negative airflow rooms, physical barriers, antitussives) have been published. The opportunity for organ and tissue donation is part of quality end-of-life care in Canada. Currently, patients with COVID-19 are being deemed medically unsuitable as potential donors. Nevertheless, across the country many people remain in need of life-saving transplants and over 20% of Canadians have registered their wish to be organ and tissue donors. Organ and tissue donation organizations (ODO) and transplant programs are continuing to maintain as much activity as possible to serve these patients. Clinicians are still encouraged to contact their provincial ODOs about potential organ donation during the pandemic.

Non-pharmacologic management at the end-of-life

General principles of end-of-life care for patients dying of COVID-19 include reviewing the care plan, discontinuing or deactivating devices such as defibrillators, discontinuing medications and interventions that do not provide comfort, repositioning, mouth care, and oxygen therapy. To address patient and family anticipatory grief and spiritual needs, it is crucial to involve interdisciplinary colleagues from nursing, spiritual care, social work, and psychology if available.

Care of the patient dying of a highly communicable infectious disease such as COVID-19 in the midst of a pandemic requires some modifications to the usual palliative approach to care. The added complexity of reducing the number of entries into isolation rooms and the donning and doffing of PPE presents an additional cognitive load. Nursing assessments should nevertheless be tailored to patient needs and use validated symptom assessment tools for common end-of-life issues including pain, agitation, and dyspnea. These assessment tools use non-verbal cues and observable behaviours to assess symptom burden in patients who cannot report their symptoms. Supporting the healthcare team by maintaining an adequate patient-to-staff ratio and ensuring frequent breaks is essential for maintaining high quality of care.

Establishing an end-of-life care plan includes reviewing the patient’s current medication list and discontinuing medications that do not contribute to patient comfort. Cardiac monitoring, routine vital signs, and extraneous tubes and lines can be selectively discontinued. Intravenous fluids and nasogastric feeding do not contribute to patient comfort at end-of-life, and may lead to complications such as pulmonary or peripheral edema. Discontinuing fluids and artificial hydration and nutrition is generally recommended. Families may worry that withdrawal of hydration and nutrition support may increase suffering at end-of-life. Discussing the risks of continuing these interventions and that patients often do not feel hunger or thirst when their body is dying can help substitute decision-makers make informed decisions. If artificial hydration and/or nutrition are continued, careful monitoring for complications of volume overload is needed. If a Foley catheter is not already in place, the clinician can consider serial bladder scans to ensure that urinary retention is not a source of patient discomfort or insertion of an indwelling catheter. Although there are no evidence-based guidelines addressing this, bladder catheterization once a patient is actively dying may be useful. It is reasonable to administer medications via an already established intravenous line but if that line becomes interstitial, a subcutaneous lock is a reliable way to administer medications for end-of-life care. This avoids the need to insert a new intravenous line, which is painful and can be challenging in this patient population.

Palliation of distressing symptoms

Dyspnea

As in respiratory failure from other illnesses, dyspnea is a prominent feature in COVID-19. Nevertheless, some
patients with COVID-19 may not display physical evidence of respiratory distress despite significant hypoxemia and the sensation of dyspnea. It is important to ask patients whether they are experiencing dyspnea and whether it is distressing to them. The overarching management principle is to optimize patient comfort while minimizing exposure to staff and visitors. Measures to address dyspnea such as a fan, high flow oxygen (> 6 L·min⁻¹), high flow nasal cannula, continuous positive airway pressure, and bilevel positive airway pressure are sometimes offered for palliation of dyspnea. Based on the current available data, several medical societies have suggested avoiding these aerosol-generating procedures if a private room with a door and appropriate PPE for all providers is not available. Fortunately, use of low flow oxygen or medical air via nasal cannula along with pharmacologic management are usually sufficient to address dyspnea at the end-of-life.

The pharmacologic management of dyspnea begins with titration of low dose opioids using a similar approach to pain management. While there is no strong evidence for use of benzodiazepines in dyspnea, they are often used when non-pharmacologic measures and opioids are inadequate and are more helpful when dyspnea is combined with anxiety. Intermittent dosing and infusions of opioids and benzodiazepines are appropriate, depending on the severity of the patient’s symptoms and can be titrated to patient comfort.

Cough

Cough is a common symptom in COVID-19, as it is in other respiratory diseases and can be very distressing to patients and their families. In the acutely dying patient, oral medications that require swallowing are not appropriate. Nebulized medications are similarly inappropriate because of the risk of aerosolization of the virus. Parenteral opioids are the mainstay in management and no specific opioid is demonstrably superior.

Agitation

Acute confusion and agitation can develop in patients nearing the end-of-life. Reversible causes can be sought and corrected if the investigations and potential treatment are consistent with the patient’s goals of care. In the actively dying phase, it may be difficult to identify a trigger for agitation. Agitation can be very distressing for family and healthcare providers and a safety risk for the patient and healthcare providers.

Anti-psychotics, classically haloperidol, are often used to manage terminal agitation without a strong evidence base. Agitation that is refractory to anti-psychotics may require sedation near the end-of-life. Again, high-quality evidence is lacking to guide clinicians in their drug selection for sedation. Bolus doses and/or infusions of sedatives such as haloperidol (0.5–1 mg sc/iv every four hours, as needed), methotrimeprazine (5–10 mg sc/iv every four hours, as needed), benzodiazepines (1–2 mg sc/iv q1h, as needed) and dexmedetomidine (0.2–0.6 μg·kg⁻¹·hr⁻¹ iv) can be used to suppress symptoms but do not reverse delirium.

Secretions

Acutely dying patients are often unable to effectively clear respiratory secretions. This creates a rattling sound with each breath that can be distressing to loved ones. Non-pharmacologic and pharmacologic treatments are commonly used without a strong evidence base. Common strategies to address secretions include regular repositioning and mouth care performed with full contact and droplet PPE, including moistening the mouth with swabs or saliva substitutes as required. Deep oropharyngeal suctioning in the patient with COVID-19 is not recommended, as this is uncomfortable, can contribute to worsening oropharyngeal secretions, and may also aerosolize virus particles. The mainstay of pharmacologic management of secretions is anti-muscarinic drugs such as glycopyrrolate (0.4 mg sc/iv every four hours, as needed), and/or octreotide (300 μg sc q8h, as needed).

Pain

Anesthesiologists are adept in the management of pain and familiar with the pharmacology of opioids, which are typically used parenterally for analgesia in patients nearing end-of-life. In general, patients who are actively dying are unable to give an accurate account of their pain and non-verbal signs and symptoms of pain should be assessed. Either intermittent dosing or a continuous infusion of opioids is appropriate and should be titrated to effect.

Conclusions

Provision of end-of-life care can be emotionally intensive under regular circumstances. During a pandemic, the weight of witnessing an increased frequency of suffering and death places healthcare workers at heightened risk of burnout. It is important to be mindful of clinicians’ well-being and is crucial that clinicians support one another. Institutional, local, and national wellness resources should be made easily available to front line clinicians providing critical and end-of-life care so that those providing this crucial care are able to continue to do so.
While pandemics create an impetus for all clinicians to review the basics of end-of-life care, this knowledge and skill set are important even in ordinary times. Skilful discussions around goals of care are important not only in critical care but also in perioperative settings. In addition, anesthesiologists have a good understanding of the medications commonly used for symptom management in patients nearing the end-of-life, and are thus well positioned to be involved in their care. This review provides guidance around sensitive discussions about goals of care and the nuances of symptom management during the COVID-19 pandemic to ensure that anesthesiologists are able to provide the highest quality of care that all patients deserve as they approach the end-of-life.

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References
1. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. JAMA 2020. DOI: https://doi.org/10.1001/jama.2020.4683.
2. National Institute for Health and Care Excellence. COVID-19 rapid guideline: critical care in adults. Available from URL: https://www.nice.org.uk/guidance/ng159 (accessed April 2020).
3. Arya A, Buchman S, Gagnon B, Downar J. Pandemic palliative care: beyond ventilators and saving lives. CMAJ 2020. DOI: https://doi.org/10.1503/cmaj.200465.
4. Vanderspank B, Roze des Ordons A, Hartwick M. Introduction to goals of care. In: Cardinal P, Witter T, Yamashita S (Eds). Navigating Medical Emergencies: An Interactive Guide to Patient Management. (Goals of Care); Royal College of Physicians and Surgeons of Canada; 2020.
5. You JJ, Fowler RA, Heyland DK; Canadian Researchers at the End of Life Network (CARENET). Just ask: discussing goals of care with patients in hospital with serious illness. CMAJ 2014; 186: 425-32.
6. Roze des Ordons, A, Vanderspank B, Hartwick M. Introduction to establishing therapeutic relationships. In: Cardinal P, Witter T, Yamashita S (Eds). Navigating Medical Emergencies: An interactive Guide to Patient Management. (Establishing Therapeutic Relationships); Royal College of Physicians and Surgeons of Canada; 2020.
7. Epstein RM, Krasner MS. Physician resilience: what it means, why it matters, and how to promote it. Acad Med 2013; 88: 301-3.
8. Novack DH, Suchman AL, Clark W, Epstein RM, Najberg E, Kaplan C. Calibrating the physician. Personal awareness and effective patient care. Working Group on Promoting Physician Personal Awareness. American Academy on Physician and Patient. JAMA 1997; 278: 502-9.
9. Lautrette A, Cirolldi M, Kuhi H, Azoulay E. End-of-life family conferences: rooted in the evidence. Crit Care Med 2006; 34(11 Suppl): S364-72.
10. Curtis JR, Patrick DL, Shannon SE, Treece PD, Engelberg RA, Rubenfeld GD. The family conference as a focus to improve communication about end-of-life care in the intensive care unit: opportunities for improvement. Crit Care Med 2001; 29(2 Suppl): N26-33.
11. Nelson JE, Walker AS, Luhrs CA, Cortez TB, Pronovost PJ. Family meetings made simpler: a toolkit for the intensive care unit. J Crit Care 2009; 24(626): e7-14.
12. Rogers CR. The characteristics of a helping relationship. Personnel Guidance J 1958; 37: 6-16.
13. Patterson K, Grenny J, McMillan R, Switzler A. Crucial Conversations: Tools for Talking When Stakes are High. NY: McGraw-Hill; 2012.
14. Weiner JS, Roth J. Avoiding iatrogenic harm to patient and family while discussing goals of care near the end of life. J Palliat Med 2006; 9: 451-63.
15. Johnson RL, Sadoty AT, Weaver AL, Goyal DG. To sit or not to sit? Ann Emerg Med 2008; 51: 188-93.
16. Baile WF, Buckman R, Lenzì R, Glover G, Beale EA, Kudelka AP. SPIKES - A six-step protocol for delivering bad news: application to the patient with cancer. Oncologist 2000; 5: 302-11.
17. Frankel RM, Stein T. Getting the most out of the clinical encounter: the four habits model. J Med Pract Manage 2001; 16: 184-91.
18. Breslow MJ, Badawi O. Severity scoring in the critically ill: part 1-interpretation and accuracy of outcome prediction scoring systems. Chest 2012; 141: 245-52.
19. Ho KM, Lee KY, Williams T, Finn J, Knuiman M, Webb SA. Comparison of Acute Physiology and Chronic Health Evaluation (APACHE) II score with organ failure scores to predict hospital mortality. Anaesthesia 2007; 62: 466-73.
20. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet 2020; 395: 1054-62.
21. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005; 173: 489-95.
22. Brummel NE, Bell SP, Girard TD, et al. Frailty and subsequent disability and mortality among patients with critical illness. Am J Respir Crit Care Med 2017; 196: 64-72.
23. Muscedere J, Waters B, Varambally A, et al. The impact of frailty on intensive care unit outcomes: a systematic review and meta-analysis. Intensive Care Med 2017; 43: 1105-22.
24. Fernandez SM, McIsaac DI, Rochwerger B, et al. Frailty and invasive mechanical ventilation: association with outcomes, extubation failure, and tracheostomy. Intensive Care Med 2019; 45: 1742-52.
25. Heyland DK, Barwich D, Pichora D, et al. Failure to engage hospitalized elderly patients and their families in advance care planning. JAMA Intern Med 2013; 173: 778-87.
26. Sibbald RW, Chadwick P, Hanelman M, Cooper AB. Checklist to meet ethical and legal obligations to critically ill patients at the end of life. Healthc Q 2011; 14: 60-6.
27. Joint Centre for Bioethics; Aid To Capacity Evaluation (ACE). Aid To Capacity Evaluation Administration. Available from URL: http://www.jcb.utoronto.ca/tools/documents/ace.pdf (accessed April 2020).
28. Downar J, Delaney JW, Hawryluck L, Kenny L. Guidelines for the withdrawal of life-sustaining measures. Intensive Care Med 2016; 42: 1003-17.

29. Provincial Health Services Authority. Zoom for Healthcare. Available from URL: http://www.phsa.ca/health-professionals/professional-resources/office-of-virtual-health/covid-19-virtual-health-toolkit/zoom (accessed: April 2020).

30. Canadian Medical Protective Association. Practising telehealth. Available from URL: https://www.cmpa-acpm.ca/en/membership/protection-for-members/principles-of-assistance/practising-telehealth (accessed April 2020).

31. Public Health Ontario. TECHNICAL BRIEF. IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19. https://www.publichealthontario.ca/-/media/documents/ncov/updated-ipac-measures-covid-19.pdf?la=en (accessed April 2020).

32. Hendin A, La Riviere CG, Williscroft DM, O’Connor E, Hughes J, Fischer LM. End-of-life care in the emergency department for the patient imminently dying of a highly transmissible acute respiratory infection (such as COVID-19). CJEM 2020. DOI: https://doi.org/10.1016/j.cjem.2020.352.

33. Gelinus C, Fillion L, Pantillo KA, Viens C, Fortier M. Validation of the critical-care pain observation tool in adult patients. Am J Crit Care 2006; 15: 420-7.

34. Ely EW, Inouye SK, Bernard GR, et al. Delirium in mechanically ventilated patients: validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). JAMA 2001; 286: 2703-10.

35. Kanji S, MacPhee H, Singh A, et al. Validation of the critical care pain observation tool in critically ill patients with delirium: a prospective cohort study. Crit Care Med 2016; 44: 943-7.

36. Sessler CN, Gosnell MS, Grap MJ, et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care unit patients. Am J Respir Crit Care Med 2002; 166: 1338-44.

37. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020; DOI: https://doi.org/10.1056/nejmoa2002032.

38. Goyal P, Choi JJ, Pinheiro LC, et al. Clinical characteristics of COVID-19 in New York City. N Engl J Med 2020. DOI: https://doi.org/10.1056/NEJMc2010419.

39. Campbell ML. Psychometric testing of a respiratory distress observation scale. J Palliat Med 2008; 11: 44-50.

40. Campbell ML, Templin T, Walch J. A respiratory distress observation scale for patients unable to self-report dyspnea. J Palliat Med 2010; 13: 285-90.

41. Kamal AH, Maguire JM, Wheeler JL, Currow DC, Abernethy AP. Dyspnea review for the palliative care professional: treatment goals and therapeutic options. J Palliat Med 2012; 15: 106-14.

42. D’Silva DF, McCulloch TJ, Lim JS, Smith SS, Carayannidis D. Extubation of patients with COVID-19. Br J Anaesth 2020. DOI: https://doi.org/10.1016/j.bja.2020.03.016.

43. Aminnejad R, Salimi A, Saeidi M. Lidocaine during intubation and extubation in patients with coronavirus disease (COVID-19). Can J Anaesth 2020. DOI: https://doi.org/10.1007/s12630-020-01627-2.

44. The Ottawa Hospital; Department of Critical Care. Extubation. Available from URL: https://www.covidottawa.com/extubation (accessed April 2020).

45. Tung A, Ferguson N, Ng N, et al. Medications to reduce emergence coughing after general anaesthesia with tracheal intubation: a systematic review and network meta-analysis. Br J Anaesth 2020. DOI: https://doi.org/10.1016/j.bja.2019.12.041.

46. Canadian Blood Services. Consensus guidance for organ donation and transplantation services during COVID19 pandemic. Available from URL: https://profedu.blood.ca/sites/msti/files/20200409_covid-19_consensus_guidance_final_0.pdf (accessed April 2020).

47. Canadian Blood Services. Donor FAQ. Available from URL: https://organissuedonation.ca/en/donor-faq (accessed April 2020).

48. Baille J, Anagnostou D, Sivell S, Van Godwin J, Byrne A, Nelson A. Symptom management, nutrition and hydration at end-of-life: a qualitative exploration of patients’, carers’ and health professionals’ experiences and further research questions. BMC Palliat Care 2018. DOI: https://doi.org/10.1186/s12904-018-0314-4.

49. Gillespie L, Raifery AM. Nutrition in palliative and end-of-life care. Nutrition 2014. DOI: https://doi.org/10.12968/bjn.2014.19. Sup7.S15.

50. Farrington N, Fader M, Richardson A, Prieto J, Bush H. Indwelling urinary catheter use at the end of life: a retrospective audit. Br J Nurs 2014; 23: S6-10.

51. Fainsinger R, Bruera E. Urinary catheters in palliative care. J Pain Symptom Manage 1991; 6: 449-51.

52. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. PLoS One 2012. DOI: https://doi.org/10.1371/journal.pone.0035797.

53. Cheung JC, Ho LT, Cheng JV, Chan EY, Lam KN. Staff safety during emergency airway management for COVID-19 in Hong Kong. Lancet Respir Med 2020. DOI: https://doi.org/10.1016/S2213-2600(20)30084-9.

54. Yu IT, Xie ZH, Tsoi KK, et al. Why did outbreaks of severe acute respiratory syndrome occur in some hospital wards but not in others? Clin Infect Dis 2007; 44: 1017-25.

55. Australian and New Zealand Intensive Care Society. ANZICS COVID-19 Guidelines. 2020. Available from URL: https://www.anzics.com.au/coronavirus-guidelines/ (accessed April 2020).

56. Alhazzani W, Moller MH, Arabi YM, et al. Surviving sepsis campaign: guidelines on the management of critically ill adults with coronavirus disease 2019 (COVID-19). Intensive Care Med 2020. DOI: https://doi.org/10.1007/s00134-020-06022-5.

57. Abernethy AP, McDonald CF, Frith PA, et al. Effect of palliative oxygen versus room air in relief of breathlessness in patients with refractory dyspnoea: a double-blind, randomised controlled trial. Lancet 2010; 376: 784-93.

58. Campbell ML, Yarandi H, Dove-Medows E. Oxygen is non-beneficial for most patients who are near death. J Pain Symptom Manage 2013; 45: 517-23.

59. Barnes H, McDonald J, Smallwood N, Manser R. Opioids for the palliation of refractory breathlessness in adults with advanced disease and terminal illness. Cochrane Database Syst Rev 2016. DOI: https://doi.org/10.1002/14651858.CD001108.pub2.

60. Simon ST, Higginson IJ, Booth S, Harding R, Weingartner V, Bausewein C. Benzodiazepines for the relief of breathlessness in advanced malignant and non-malignant diseases in adults. Cochrane Database Syst Rev 2016. DOI: https://doi.org/10.1002/14651858.CD007354.pub3.

61. Boneau A. Cough in the palliative care setting. Can Fam Physician 2009; 55: 600-2.

62. Lawlor P, Bush S. Delirium in patients with cancer: assessment, impact, mechanisms and management. Nat Rev Clin Oncol 2015; 12: 77-92.

63. Bush S, Leonard MM, Agar M, et al. End-of-life delirium: issues regarding recognition, optimal management, and the role of sedation in the dying phase. J Pain Symptom Manage 2014; 48: 215-30.

64. Hosker CM, Bennett MI. Delirium and agitation at the end of life. BMJ 2016. DOI: https://doi.org/10.1136/bmj.i3085.
65. *McLaughlin M, Marik PE*. Dexmedetomidine and delirium in the ICU. Ann Transl Med 2016. DOI: https://doi.org/10.21037/atm.2016.05.44.

66. *Wee B, Hillier R*. Interventions for noisy breathing in patients near to death. Cochrane Database Syst Rev 2008. DOI: https://doi.org/10.1002/14651858.CD005177.pub2.

67. *Arcuri JF, Abarshi E, Preston NJ, Brine J, Pires Di Lorenzo VA*. Benefits of interventions for respiratory secretion management in adult palliative care patients—a systematic review. BMC Palliat Care 2016. DOI: https://doi.org/10.1186/s12904-016-0147-y.

68. *Wu PE, Styra R, Gold WL*. Mitigating the psychological effects of COVID-19 on health care workers. CMAJ 2020. DOI: https://doi.org/10.1503/cmaj.200519.

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