

HEALTHCARE DELIVERY

Critical care triaging in the shadow of COVID-19: Ethics considerations

J A Singh,¹ BA, LLB, LLM, MHSc, PhD; K Moodley,² MB ChB, MFamMed, FCFP (SA), MPhil (Applied Ethics), Executive MBA, DPhil

¹ Centre for the AIDS Programme of Research in South Africa (CAPRISA), University of KwaZulu-Natal, Durban, South Africa

² Centre for Medical Ethics and Law, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa

Corresponding author: J A Singh (singhj9@ukzn.ac.za)

Since the World Health Organization declared coronavirus disease 2019 (COVID-19) a Public Health Emergency of International Concern, COVID-19 infection and the associated mortality have increased exponentially, globally. South Africa (SA) is no exception. Concerns abound over whether SA's healthcare system can withstand a demand for care that is disproportionate to current resources, both in the state and private health sectors. While healthcare professionals in SA have become resilient and adept at making difficult decisions in the face of resource limitations, a surge in COVID-19 cases could place a severe strain on the country's critical care services and necessitate unprecedented rationing decisions. This could occur at two critical points: access to ventilation, and withdrawal of intensive care in non-responsive or deteriorating cases. The ethical dimensions of decision-making at both junctures merit urgent consideration.

S Afr Med J 2020;110(5):355-359. <https://doi.org/10.7196/SAMJ.2020.v110i5.14778>

Since the World Health Organization (WHO) designated the unfolding coronavirus disease 2019 (COVID-19) pandemic a Public Health Emergency of International Concern on 30 January 2020,^[1] COVID-19 has significantly disrupted clinical care decision-making in affected countries. In March 2020, the WHO published interim clinical guidance on the care of COVID-19 patients aimed at health ministers, health system administrators, and other decision-makers.^[2] In its guidance, the WHO highlighted the findings of a large cohort study of COVID-19 patients,^[3] noting that ~40% of patients with COVID-19 may have mild disease, where treatment is mostly symptomatic and does not require inpatient care; ~40% of patients have moderate disease that may require inpatient care; ~15% of patients have severe disease that requires oxygen therapy or other inpatient interventions; and ~5% have critical disease that requires mechanical ventilation.^[2] Where COVID-19 community transmission is established, the WHO has recommended that hospital authorities determine allocation of lifesaving resources for healthcare workers and patients. Despite an unprecedented national lockdown being declared in South Africa (SA) on 15 March 2020, COVID-19 cases in SA have continued to rise and community transmission is now established. This situation raises the prospect that a surge in cases may be imminent, which could overwhelm the country's health system. Accordingly, difficult critical care triaging decisions will have to be made, as a matter of urgency, in the country's private and state sectors. SA intensivists have considerable experience in rationing critical care resources in the country's resource-scarce environment. However, rationing in the context of a pandemic 'surge' is unprecedented in the country's history. Such decision-making raises profound governance and ethics issues.

Limited resources: The status quo in SA

The principle of distributive justice (the fair distribution of limited resources) has been central to healthcare decision-making in the

public sector. Given an SA population of ~59 million, there are limited intensive care unit (ICU) beds, limited ventilators,^[4,5] limited critical care clinicians,^[6,7] and suboptimal personal protective equipment (PPE) for health workers.^[8,9] It is evident from the experience of advanced economies, such as Italy, Spain and the USA,^[10] that critical care resources in SA, which are already under-resourced, could experience unprecedented strain if COVID-19's presence in SA mirrors the exponential growth patterns seen elsewhere. The rationing of ICU beds and ventilators will be crucial to mitigating this scenario.

Ethical principles underlying rationing frameworks

In developing criteria for admission to an ICU during humanitarian emergencies, healthcare professionals are guided by broad ethics principles. As a first step, it is important to establish whether a patient wishes to have access to mechanical ventilation. Some patients may have documented their wishes in this regard in advance healthcare directives, such as 'living wills'.

For patients who have indicated that they wish to have access to mechanical ventilation, or for those who have not indicated their preference, several options exist regarding how to choose among them. Most frameworks, to date, suggest that all attempts be made to save as many lives as possible, specifically individuals with a reasonable chance of survival. This utilitarian approach is consistent with public health ethics and typically prioritises the young and healthy. However, some argue that the life of a 50-year-old with experience, skills and proven ability to make a contribution to society is more valuable than the life of a 20-year-old. Clearly, youth must be balanced with many other factors. The number of life-years post ventilation is also an important consideration.^[11] Perhaps the most important consideration, however, is clinical suitability for critical care. Given that countries badly affected by COVID-19 have experienced a surge of patients who needed admission to an

ICU concurrently, ICU and ventilator triaging will be crucial in a pandemic surge scenario. Dedicated professional clinical guidance in a pandemic context is therefore crucial.

South African guidance

Unlike laws and accompanying regulations, guidelines and guidance documents are not binding. However, they can serve as a moral compass and provide useful guidance when laws are silent on an issue, or when adherence to legal prescripts could yield unethical outcomes. The Health Professions Council of South Africa (HPCSA) has published guidance on withholding or withdrawing treatment.^[12] The guideline states: 'When the patient or the family request continued treatment against health advice that considers such treatment to be futile, the patient or the family must be given the choice of transferring to another institution where such treatment is available. If this option is refused and the health team considers treatment to be futile, and this is confirmed by an independent health care practitioner, treatment may be withheld or withdrawn.' The option of transferring to 'another institution where such treatment is available' is improbable in a COVID-19 pandemic scenario, where only certain facilities are designated to provide COVID-19 critical care, and all such available facilities are likely to be facing surge scenarios simultaneously. The HPCSA guideline is therefore not apt for a COVID-19 pandemic context.

In 2019, the Critical Care Society of Southern Africa (CCSSA) published its 'Consensus Guideline on ICU triage and rationing'.^[13] This guidance, too, is not apt in a pandemic context. In recognition thereof, and in response to the COVID-19 pandemic, the CCSSA published new guidance, 'Allocation of scarce critical care resources during the COVID-19 public health emergency in South Africa' (hereinafter 'CCSSA 2020'), on 2 April 2020.^[14] The CCSSA deserves praise for its swift response to COVID-19. CCSSA 2020 draws liberally on a COVID-19 guidance document published by the University of Pittsburgh, Pennsylvania, USA.^[15] The stated goal of CCSSA 2020 is 'to provide guidance for the triage of critically ill patients in the event that a public health emergency creates demand for critical care resources (e.g., ventilators, critical care beds) that outstrips the supply'.

CCSSA 2020 takes into account detailed clinical assessments, using criteria that would render any patient (COVID or non-COVID) eligible for ICU care. If a patient meets ICU entry criteria (i.e. critically ill and needs ventilatory support/other organ support that can only be found in an ICU), and has not indicated a wish not to be treated, clinicians will then have to determine whether the patient is *likely to benefit* from ICU admission. If a patient is likely to benefit from ICU care, the patient is assessed on a Clinical Frailty Scale (CFS). Frailty is characterised by increased vulnerability to external stressors. The CFS has been found to be a good predictor to detect older adults at high risk of complicated treatment and prolonged longer stays,^[16] but its application is not limited to older adults.^[17] Those who achieve a Clinical Frailty Score (CFS) of <6 move to the next stage: *priority scoring* for ICU access.

At this stage, the Sequential Organ Failure Assessment (SOFA) is used to rate a patient (1 - 4 points), plus scoring based on the presence or absence of comorbid conditions (1 - 4 points). These points are then added together to produce a 'total priority score', which ranges from 1 to 8. This raw priority score is converted to three colour-coded priority groups (red = high priority, orange = intermediate priority, yellow = low priority) to facilitate streamlined implementation in individual hospitals. Based on this system, individuals who score lowest are given the highest priority to receive critical care beds and services.

For the CCSSA 2020 triaging scheme to work, each patient will require a careful assessment based on medical history (for example, diabetes, hypertension, cardiac disease, chronic lung disease) and prognosis. In SA, HIV infection is likely to be a comorbidity. CCSSA 2020 counts AIDS-defining illnesses or uncontrolled disease with a poor prognosis (viral load >10 000 copies/mL despite treatment, or recent HIV diagnosis not on treatment with a CD4+ count <50 cells/ μ L) as a 'major comorbid condition with substantial impact on long-term survival', along with conditions such as end-stage renal disease in patients aged <75 years, and moderate Alzheimer's disease or related dementia. CCSSA 2020 regards such comorbidities as being associated with 'significantly decreased long-term survival'. Patients presenting with such conditions would score 6 - 8 on the scoring system, and not enjoy prioritised access to ICU care.

While CCSSA 2020's scoring system provides an objective and validated measure of acute physiology, it is not practical in a pandemic context. First, in the CCSSA 2020's flowchart summary, with regard to the 'frailty assessment scale', the guidance advises: 'Assess function 1 - 2 weeks prior to presentation.' Taken literally, conducting such an assessment 1 - 2 weeks prior to ICU presentation is not feasible in a surge pandemic context, as critically ill people may suddenly present for intubation, with no prior interaction with the health system. The prospective application of a frailty assessment scale in such a context is rendered meaningless. If the wording was intended to mean that the patient's condition must be assessed in light of their condition in the prior 2 weeks, this should be made unambiguous. But this, too, may not be possible or feasible in an SA context. Such an assessment will necessitate interviews with the patient's significant others, who may not be traceable or contactable. For instance, because of the patient's condition, a family member is likely to be unable to accompany the patient to the hospital, or remain there, because of COVID-19 containment measures. If the patient lives away from home - say, at a migrant single-sex hostel - their next of kin are not likely to be in a position to answer questions about the patient's 'frailty' for the prior 2 weeks, as they would typically not have seen the patient for a period exceeding 2 weeks. CCSSA 2020 is silent on whether 'frailty' relates to age, and/or impairment,^[18] and/or permanent disability, and/or temporary incapacity (for example, related to COVID-19 infection). Such issues merit urgent clarification.

Even if a 'frailty' assessment is possible, in the next stage of the process, the results of diagnostic tests to inform a SOFA score could take upwards of 24 hours. With diagnostics laboratories facing considerable strain in a pandemic scenario, such timelines will be unfeasible and unsustainable. From a systemic perspective, such a system may also be challenging to implement in an SA context. For instance, doctors at primary healthcare centres and rural hospitals will be referring patients to dedicated COVID critical care centres, over and above distressed patients who may present directly at critical care centres. Accordingly, a simpler, quicker triage guide is required to facilitate a rapid decision to intubate or not. Such timely decision-making, by necessity, will have to be based on intuitive, but reasoned, clinical discretion. This is important because intubation and extubation carry a high risk of infection to frontline healthcare workers owing to aerosolisation of the virus.^[19,20] Coupled with suboptimal or absent PPE in SA, intubation with a view to ventilation should take place in patients with a high potential to benefit from ventilation. Feasibility aside, CCSSA 2020 also raises profound ethical implications.

In a tie, who to choose, and why?

CCSSA 2020 envisages that clinicians will encounter ties in their scoring process. In the event that there are ties between patients in the

same 'priority groups' (e.g. the 'red group', which equates to highest priority for ventilator access), CCSSA 2020 bases prioritisation on 'life-cycle considerations', with priority going to 'younger patients, who have had less opportunity to live through life's stages'. CCSSA 2020 categorises groups into the following age brackets: age 12 - 40, age 41 - 60, age 61 - 75, and older than age 75. CCSSA 2020's stated ethical justification for incorporating the 'life-cycle principle' is that 'it is a valuable goal to give individuals equal opportunity to pass through the stages of life – childhood, young, adulthood, middle age, and old age' and that justification for this principle 'does not rely on considerations of one's intrinsic worth or social utility. Rather, younger individuals receive priority because they have had the least opportunity to live through life's stages.' In addition, CCSSA 2020 affords 'heightened priority' to individuals 'who perform tasks that are vital to the public health response – specifically, those whose work supports the provision of acute care to others'. CCSSA 2020 notes that this category 'should be broadly construed to include those individuals who play a critical role in the chain of treating patients and maintaining societal order'. It is unclear how clinicians will be able to determine whether an individual should enjoy 'heightened priority' to resources in a pandemic surge context. That said, such prioritisation is ethically defensible, is strongly supported in some quarters,^[21] and should be implemented to preserve a highly skilled and limited healthcare resource during the pandemic, and beyond.

With regard to patients who are triaged to not receive ICU beds or services, CCSSA 2020 recommends that such individuals be offered medical care, including intensive symptom management and psychosocial support. CCSSA 2020 recommends regular (daily or twice-daily) determinations to be made about what priority scores will result in access to critical care services. Such determinations are to be based on real-time knowledge of the degree of scarcity of the critical care resources, as well as information about the predicted volume of new cases that will be presenting for care over the near-term. CCSSA 2020 recommends reassessment for ongoing provision of critical care/ventilation. Patients showing improvement will continue to receive critical care services until the next assessment. The stated ethical justification for doing so is that, in a public health emergency when there are not enough critical care resources for all, the goal of maximising population outcomes would be jeopardised if patients who were determined to be unlikely to survive were allowed indefinite use of scarce critical care services. Such a position is ethically defensible in a pandemic context.

CCSSA 2020 also provides guidance on withdrawal of care. If there are patients in the queue for critical care services, then patients who, upon reassessment, show substantial clinical deterioration, as evidenced by worsening SOFA scores or overall clinical judgement, that portends a very low chance for survival, should have critical care withdrawn, including discontinuation of mechanical ventilation, after this decision is disclosed to the patient and/or family. Such a position is ethically defensible in a pandemic context, although such determinations will have to be made virtually instantaneously in a pandemic surge context.

While many of CCSSA 2020's recommendations are ethically defensible, many are also at odds with recent COVID-19 guidance issued by UK and US professional associations. These differences merit noting.

UK guidance

COVID-19 critical care admission guidance issued by the National Institute of Health and Care Excellence^[22] (NICE) – which applies to the National Health System in England and Wales – recommends admission to critical care based on a CFS assessment, in line with

CCSSA 2020. The British Medical Association (BMA) has published dedicated clinical ethics guidance on COVID-19 that covers critical ethics issues, including treatment denial, treatment withdrawal, prejudicial clinical decision-making in the absence of surrogate decision-makers, ICU qualification criteria, resuscitation, palliative care and procedural fairness (BMA, 2020).^[23] The BMA guidance is not based on a scoring system.

The BMA supports withdrawing treatment from an individual who is stable or even improving but whose objective assessment indicates a worse prognosis than another patient who requires the same resource, in line with CCSSA 2020. The BMA noted that it is ethical and legal to refuse someone potentially life-saving treatment when someone else has a higher priority for the available treatment. CCSSA 2020 makes no mention of legal implications of withdrawing or withholding potentially life-saving treatment, leaving the possibility open for clinicians following the guidance to doubt their actions on legal grounds. On the issue of surrogate decision-making, the BMA advises that if there is a need to limit the availability of intensive care for patients because of the COVID-19 pandemic and a critical shortfall in ICU capacity, it would be unethical to apply those limits differently to patients with or without appointed surrogate decision-makers or those with or without particular religious views. CCSSA 2020 is silent on surrogate decision-making and religious views. This is problematic. The BMA position is more practical in a pandemic context and ethically defensible.

The BMA has noted that where a decision is made to withhold or withdraw some forms of treatment from patients on the grounds of resource allocation, it is crucial that those patients still receive compassionate and dedicated medical care and attention, as far as possible in the circumstances. This is mirrored in CCSSA 2020 and is ethically commendable.

Whereas CCSSA 2020 categorises people into age groups and prioritises younger patients based on the 'life cycle' principle, the BMA stresses that younger patients should *not* be automatically prioritised over older ones. This is a significant recommendation given that older people infected with COVID-19 experience disproportionate mortality, and signifies that the BMA recognises that an approach based solely on clinically relevant factors may, statistically, prioritise the younger and, where clinically relevant, may discriminate against those with underlying health conditions. Whereas CCSSA 2020 admits patients with comorbidities if they score low in the CCSSA grading process (with a low score equating to high priority in terms of the CCSSA scoring system), the BMA notes that if patients have sufficient background illness, comorbidity and/or frailty, they would *not* be admitted to intensive care, and that cardiopulmonary resuscitation (CPR) would *not* be commenced in the event of a collapse. CCSSA 2020 is silent on CPR. In the context of overwhelming demand, the BMA advises that if patients' prognosis worsens after admission to intensive care – sufficiently that, if it had been the case prior to admission, the treatment would not have been commenced – it should be withdrawn and the same facility offered to another patient reasonably believed to have the capacity to benefit quickly. CCSSA 2020's recommendation for withdrawal of care is not based on such retrospective reflection and reasoning. The BMA's reflective recommendation is practical and ethically defensible in a pandemic surge scenario.

The BMA has stressed the importance of fair process and procedural ethics, noting that decisions at all levels should be made openly, accountably, transparently, by appropriate bodies, and with full public participation (to the extent possible within the timescale within which decisions need to be made). While the BMA notes that there may also be a role for scrutiny of individual decisions

by a second doctor, or where appropriate by properly constituted clinical ethics committees, where time permits, the BMA makes no recommendation for an appeals process. On the other hand, CCSSA 2020 makes no acknowledgment of tight timescales, and notes that 'an appeals process for individualized triage decisions needs to be in place'.

US guidance

In its response to the COVID-19 pandemic, the American Medical Association (AMA) has summarised a collection of relevant ethics opinions published over the years related to 'crisis standards of care'.^[24] The AMA has noted that triage protocols must be applied fairly and consistently for all patients. The AMA has noted that physicians have a responsibility 'to evaluate the risks of providing care to individual patients versus the need to be available to provide care in the future'. CCSSA 2020 is silent on the issue of future care. In public health emergencies, when CPR is unlikely to provide the intended clinical benefit and participating in resuscitation significantly increases already higher than usual risk for healthcare professionals, the AMA advises that it may be ethically justifiable to withhold CPR without the patient's consent. As noted earlier, CCSSA 2020 is silent on CPR provision or denial.

The AMA advises that triaging decisions must be based on criteria related to medical need, not on non-medical criteria such as patients' social worth. When criteria of medical need differ among patients, the AMA recommends that limited resources should be first allocated based on likelihood of benefit or to avoid premature death, and then to promote the greatest duration of benefit after recovery. This is at odds with CCSSA 2020, which prioritises younger individuals, and affords 'heightened priority' to individuals 'who perform tasks that are vital to the public health response – specifically, those whose work supports the provision of acute care to others'. As noted earlier, there may be no time to assess social worth in a pandemic surge context.

When choosing among equals, some authors have suggested a 'first-come, first-served' approach.^[21] Others have argued that a 'first-come, first-served' general approach in a pandemic scenario will not work.^[11] This is because the patients who arrive first at a hospital may not require ICU care, or they may not benefit the most from such care. Social factors also impact on who will arrive at a hospital first. Those who are better resourced are most likely to present to hospitals first. Given such factors, when criteria of medical need do not substantially differ among patients, the AMA advises that limited resources should be allocated according to an objective and transparent mechanism, such as random choice or lottery to minimise potential bias, as opposed to 'first come, first served', which may unfairly privilege patients who have the means to seek care promptly. This may be important in the SA context, where affluent patients with their own vehicles and health insurance are likely to access critical care sooner. CCSSA 2020 is silent on this issue, and instead bases prioritisation on a health-based scoring system.

In line with the position taken by the CCSSA and the BMA, the AMA advises periodic reassessment of ongoing life-sustaining treatments for all patients. When continued treatment is substantially unlikely to achieve the intended goal of care, it may be withdrawn. The AMA recommends that palliative care must be provided when life-sustaining treatments are withheld or withdrawn, echoing the BMA and CCSSA recommendations.

The AMA advises that the policies and procedures by which triage decisions that allocate life-sustaining treatments are made should be made known, and an appeals process should be established when such treatment is to be withheld or withdrawn. CCSSA 2020 also recommends transparency and the creation of an appeals process.

While the establishment of a formal process is noble and fair under 'ordinary circumstances', and the SA Constitution guarantees persons the right to administrative action which is lawful, reasonable and procedurally fair,^[25] it is arguable whether such a mechanism is practical and feasible in a pandemic surge scenario, where all available resources are under considerable strain, and there may be no time to engage an appeals mechanism. Furthermore, while people have the right to take administrative decisions on review through the courts,^[26] such actions may not have time to play out in time-sensitive contexts. This seems to be the rationale taken by the BMA, which recommends fair process in prioritisation decision-making, but makes no recommendation for the creation of an appeals mechanism.

Other shortcomings in CCSSA 2020

The CCSSA states that its triage recommendations 'will be enacted only if: 1) critical care capacity is, or will shortly be, overwhelmed despite taking all appropriate steps to increase the surge capacity to care for critically ill patients; and 2) His Excellency, the President of South Africa has declared a public health emergency'.

Point 2 is of particular concern. In terms of SA law, a 'State of Disaster'^[27] and a 'State of Emergency'^[28] are distinct from each other and governed by different legislation. A State of Emergency has never been declared in SA's post-apartheid history. To date, government has declared a State of Disaster in regard to the COVID-19 pandemic,^[29] and passed several regulations in accordance therewith. The President is unlikely to also concurrently declare a 'State of Emergency' on public health grounds, especially given the far-reaching implications such a declaration could have on civil rights in the country. For example, almost all human rights contained in chapter 2 of the Constitution could be suspended. Given that CCSSA 2020 was published on 2 April 2020, more than 2 weeks after the country's State of Disaster was declared on 15 March 2020,^[29] it cannot be said that the CCSSA was unaware of the President's State of Disaster declaration. By implication, then, the CCSSA is still awaiting a 'public health emergency' to be declared for their guidance to become operational. This is untenable. Alternatively, if such an interpretation was unintended, along with the other shortcomings highlighted above, CCSSA 2020 merits urgent revision.

Conclusions

In SA, having a consistent, simple, practical COVID-19 ICU prioritisation plan in place is an ethical imperative. It must take into account the country's limited human and medical resources such as ICU beds and ventilators. It must also acknowledge the wealth of experience of intensivists in SA and their longstanding ability to triage. Any triage framework must be ethically robust and easy to implement in busy outpatient departments and emergency room settings. Not only is this important to ensure fairness in how limited resources are allocated, it is also necessary for efficiency in dealing with the country's COVID-19 response. In the proverbial 'calm before the storm', we need to hope that drastic COVID-19 ICU and ventilator rationing will not become a reality in SA. However, experience from elsewhere in the world suggests otherwise. We should therefore be prepared to face any coming storm.

Acknowledgements. The authors thank Dr Usha Lalla, Prof. Coenie Koegelenberg (Department of Medicine) and Dr Ryan Davids (Division of Anaesthesiology), Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, for insights into local ICU triage procedures.

Author contributions. KM conducted a literature review of the major intensive care triage philosophical approaches and ethics frameworks emerging internationally at the onset of COVID-19, including the CCSSA 2020 framework. JAS conducted a literature review of professional guidance published by the HPCSA, NICE, BMA, and AMA, and conducted a comparative analysis of these guidance frameworks with CCSSA 2020. JAS and KM jointly drafted and approved the manuscript.

Funding. JAS is supported by the Centre for the AIDS Programme of Research in South Africa (CAPRISA), Durban, South Africa. He is also supported by the HIV Prevention Trial Network and the Bill and Melinda Gates Foundation. No specific funding was received for writing this article. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The views of the writer do not necessarily reflect the views of his funders or employers. KM receives funding from the National Institutes of Health for research ethics capacity development in southern Africa (D43). However, the grant did not fund this work. Views expressed are in her personal capacity.

Conflicts of interest. None.

- World Health Organization. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). Geneva: International Health Regulations (2005) Emergency Committee, 2020. [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)) (accessed 27 March 2020).
- World Health Organization. Operational considerations for case management of COVID-19 in health facility and community: Interim guidance. 19 March 2020. https://apps.who.int/iris/bitstream/handle/10665/331492/WHO-2019-nCoV-HCF_operations-2020.1-eng.pdf (accessed 3 April 2020).
- Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020;323(13):1239-1242. <https://doi.org/10.1001/jama.2020.2648>
- Cowan K. Coronavirus: Africa 'unfortunately' last in queue for life-saving ventilators amid global shortage. *News24*, 29 March 2020. <https://www.news24.com/SouthAfrica/News/coronavirus-africa-unfortunately-last-in-queue-for-life-saving-ventilators-amid-global-shortage-20200329> (accessed 29 March 2020).
- Naidoo K, Singh JA, Lalloo U. HIV/AIDS and admission to intensive care units: A comparison of India, Brazil and South Africa. *S Afr J HIV Med* 2013;14(1):15-16. <https://doi.org/10.7196/SAJHIVMED.887>
- Bhagwanjee S, Scribante J. The Council of the Critical Care Society of Southern Africa. National audit of critical care resources: How long before we act? *S Afr J Crit Care* 2008;24(1):4-6.
- De Beer J, Brysiewicz P, Bhengu BR. Intensive care nursing in South Africa. *S Afr J Crit Care* 2011;27(1):6-10.
- Ngubane N. Covid-19: Emergency workers refuse to attend to patient until they get proper equipment. *GroundUp*, 30 March 2020. <https://www.groundup.org.za/article/covid-19-emergency-service-workers-demand-protective-gear-they-will-attend-patients/> (accessed 3 April 2020).
- Pillay K, Comins L. KZN health-care workers hardest hit by protective gear shortages. *IOL*, 2 April 2020. <https://www.iol.co.za/mercury/news/kzn-health-care-workers-hardest-hit-by-protective-gear-shortages-45977381> (accessed 3 April 2020).
- Truog RD, Mitchell C, Daley GQ. The toughest triage – allocating ventilators in a pandemic. *N Engl J Med* 2020 (epub 23 March 2020). <https://doi.org/10.1056/NEJMp2005689>
- Emanuel EJ, Persad G, Upshur R, et al. Fair allocation of scarce medical resources in the time of COVID-19. *N Engl J Med* 2020 (epub 23 March 2020). <https://doi.org/10.1056/NEJMs2005114>
- Health Professions Council of South Africa. Guidelines for the withholding and withdrawing of treatment. Booklet 7. https://www.hpcs.co.za/Uploads/Professional_Practice/Conduct%20%26%20Ethics/Booklet%207%20Guidelines%20withholding%20and%20withdrawing%20treatment%20September%202016.pdf (accessed 3 April 2020).
- Joynt GM, Gopalan PD, Argent A, et al. The Critical Care Society of Southern Africa Consensus Guideline on ICU triage and rationing (ConICTri). *S Afr Med J* 2019;109(8):630-642 | *S Afr J Crit Care* 2019;35(1):53-65. <https://pdfs.semanticscholar.org/551d/9adfa09f16b9667610a7da41e530b30f7dee.pdf> (accessed 3 April 2020).
- Critical Care Society of Southern Africa. Allocation of scarce critical care resources during the COVID-19 public health emergency in South Africa. <https://criticalcare.org.za/wp-content/uploads/2020/04/Allocation-of-Scarce-Critical-Care-Resources-During-the-COVID-19-Public-Health-Emergency-in-South-Africa.pdf> (accessed 3 April 2020).
- White DB. A model hospital policy for allocating scarce critical care resources. University of Pittsburgh School of Medicine. <https://ccm.pitt.edu/?q=content/model-hospital-policy-allocating-scarce-critical-care-resources-available-online-now> (accessed 3 April 2020).
- Juma S, Taabazuing MM, Montero-Odasso M. Clinical frailty scale in an acute medicine unit: A simple tool that predicts length of stay. *Can Geriatr J* 2016;19(2):34-39. <https://doi.org/10.5770/cgj.19.196>
- Tuffrey-Wijne L. Covid-19: The Clinical Frailty Scale is not suitable for use with people with learning disabilities. 26 March 2020. <https://www.nursingtimes.net/opinion/covid-19-the-clinical-frailty-scale-and-people-with-learning-disabilities-26-03-2020/> (accessed 6 April 2020).
- Ryan F. It is not only coronavirus that risks infecting society – our prejudices do, too. Guidelines about who could be too frail for treatment must not discriminate against disabled people. *The Guardian*, 9 April 2020. <https://www.theguardian.com/commentisfree/2020/apr/09/nice-guidelines-coronavirus-pandemic-disabled> (accessed 9 April 2020).
- Santarpija JL, Rivera DN, Herrera V, et al. Transmission potential of SARS-CoV-2 in viral shedding observed at the University of Nebraska Medical Center. <https://www.medrxiv.org/content/10.1101/2020.03.23.20039446v2.full.pdf> (accessed 5 April 2020).
- National Academies of Science, Engineering, and Medicine. Rapid expert consultation on the possibility of bioaerosol spread of SARS-CoV-2 for the COVID-19 pandemic. 1 April 2020. <https://www.nap.edu/catalog/25769/rapid-expert-consultation-on-the-possibility-of-bioaerosol-spread-of-sars-cov-2-for-the-covid-19-pandemic-april-1-2020> (accessed 1 April 2020).
- Sokol D. The life and death decisions of COVID-19. *The BMJ Opinion*, 20 March 2020. <https://blogs.bmj.com/bmj/2020/03/20/daniel-sokol-the-life-and-death-decisions-of-covid-19/> (accessed 3 April 2020).
- National Institute of Health and Care Excellence, United Kingdom. COVID-19 rapid guideline: Critical care in adults. 20 March 2020. <https://www.nice.org.uk/guidance/ng159/chapter/2-Admission-to-critical-care> (accessed 6 April 2020).
- British Medical Association. COVID-19 – ethical issues: A guidance note. <https://www.bma.org.uk/media/2226/bma-covid-19-ethics-guidance.pdf> (accessed 5 April 2020).
- American Medical Association. Crisis standards of care: Guidance from the AMA Code of Medical Ethics. <https://www.ama-assn.org/delivering-care/public-health/crisis-standards-care-guidance-ama-code-medical-ethics> (accessed 5 April 2020).
- Section 33, Constitution of the Republic of South Africa, 1996. <https://www.gov.za/documents/constitution/chapter-2-bill-rights#33> (accessed 15 April 2020).
- Section 34, Constitution of the Republic of South Africa, 1996. <https://www.gov.za/documents/constitution/chapter-2-bill-rights#34> (accessed 15 April 2020).
- Disaster Management Act, 2002 (Act No. 57 of 2002). *Government Gazette* No. 2444252:98. 15 January 2003. http://www.cogta.gov.za/cgta_2016/wp-content/uploads/2016/06/DISASTER-MANAGEMENT-ACT.pdf (accessed 5 April 2020).
- State of Emergency Act, 1997 (Act No. 64 of 1997). <https://www.justice.gov.za/legislation/acts/1997-064.pdf> (accessed 5 April 2020).
- National Gazette No. 43096, 15 March 2020. https://www.greengazette.co.za/documents/national-gazette-43096-of-15-march-2020-vol-657_20200315-GGN-43096 (accessed 5 April 2020).

Accepted 15 April 2020.