COVID-19 Pandemic Healthcare Resource Allocation, Age and Frailty

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The current coronavirus pandemic presents the greatest healthcare crisis in living memory. Hospitals across the world have faced unprecedented pressure. In the face of this tidal wave of demand for limited healthcare resources, how are clinicians to identify patients most likely to benefit? Should age or frailty be discriminators? This paper seeks to analyse the current evidence-base, seeking a nuanced approach to pandemic decision-making, such as admission to critical care.

KEYWORDS COVID-19, critical care, triage ethics, bioethics, resource allocation, frailty

Introduction

The current coronavirus pandemic presents the greatest healthcare crisis in living memory. Hospitals across the world have faced unprecedented pressure. In the face of this tidal wave of demand for limited healthcare resources; how are clinicians to identify patients most likely to benefit? Should age or frailty be discriminators?

Recognizing frailty

Better nutrition, public health and disease management have resulted in increasing numbers of older and frail people (World Health Organization 2020). There is no clear universal consensus regarding the definition of frailty, but many accept that a loss of biological reserve, a failure of homeostatic mechanisms and a vulnerability
to adverse outcomes (Flaaten and Clegg 2018), or a state of increased vulnerability to a poor resolution of homeostasis following a minor stress (e.g. medication change, infection) (Clegg et al. 2013) are indicators of frailty. Frail older people are also more susceptible to infection secondary to a resting low-level inflammatory state, poorly functioning phagocytosis and an over-responsive production of cytokines which persists long after the infection has diminished (Clegg et al. 2013, Soysal et al. 2016).

In the hospital setting, many clinicians use the Clinical Frailty Scale (CFS) (Rockwood et al. 2005) to determine the severity of frailty prior to admission. Other scores exist, but are not so straightforward to perform rapidly, by all staff, in the acute clinical setting. Response to illness, recovery, and rehabilitation is associated with pre-morbid functional level and frailty, which is important information when medical staff are determining how, when and where people should be managed in the context of medical emergencies or pandemics, such as those caused by influenza or the present COVID-19 crisis.

**Coronavirus pandemic**

The coronavirus SARS-CoV-2, and its disease COVID-19 were first identified in Wuhan, China, at the end of 2019. It is a highly contagious pathogen, affecting many, causing extreme morbidity in a small percentage, with some requiring admission to Critical Care Units for mechanical ventilation or other organ support. In response to the increased demand for critical care, health services responded by temporarily increasing their bed capacity, including the rapid construction of temporary hospitals in the UK and elsewhere, and transferring patients between hospitals for mutual aid.

**Patient selection and resource allocation**

When considering which patients should be fully escalated to invasive mechanical ventilation or other organ support, critical care physicians need to ensure that appropriate patients are identified for admission (Ballantyne et al. 2020). If demand for scarce Critical Care resources outstrips supply, hard and difficult decisions/choices will be needed, with the potential for some critical care services being triaged, such as invasive mechanical ventilation, cardiovascular support (inotropes), and renal support (haemodialysis/haemofiltration). Some patients may have to have support withdrawn to make way for others with more potential to benefit.

Guidance in the UK from the British Medical Association (2020) and the Royal College of Physicians (2020) has emphasized a utilitarian approach (which depends on rationality) (Mack 2004) in these circumstances, to maximize resource use to achieve the most benefit, ‘the greatest good for the greatest number,’ tending to ignore other factors. In the case of medical need, the simplest measure of benefit is survival initially, and then life years gained.
If rationing of healthcare resources is required, concern must be taken to provide equity and access of care. However, a treatment that is available and accessible to a patient may still have limited utility. Therefore, healthcare services must aspire to ensure that people are offered the care most appropriate to their needs, and not to offer treatments that are overly burdensome, harmful, or unlikely to provide benefit (futile) (Ballantyne et al. 2020). Treatments, once commenced, that are no longer providing benefit can and should be appropriately withdrawn.

**COVID-19 outcomes**

Data from the Office for National Statistics (2020) show age-standardised and age-specific mortality rates for deaths due to the coronavirus (COVID-19) were statistically significantly higher for all age groups compared with rates for deaths due to influenza and pneumonia for 2020 and the influenza and pneumonia five-year average. Similar to deaths caused by influenza and pneumonia, people aged 85 years and over had the highest age-specific mortality rate from COVID-19 (with 2,068.3 deaths per 100,000 people), which was statistically significantly higher than all other age groups. Case fatality rates are significantly higher in those over the age of 80 compared to those 40–49 years in all countries (Dowd et al. 2020). For those critically ill patients with COVID-19 admitted to critical care in England, Wales and Northern Ireland from 1st September 2020 to 31st January 2021 and requiring advanced respiratory support, 74.6% of those patients aged 70 years and older died in critical care Whilst 59% of those aged 50–69 years and 34.3% of those aged 16–49 years died in critical care (ICNARC 2020). In the general hospital population, the effect of age on mortality was accentuated by the presence of increasing frailty and comorbidities (Navaratnam et al. 2021).

If we are to offer as many people as possible the opportunity for survival, how are Critical Care Unit clinicians to select the most appropriate candidates, ideally not based on a single criterion? (Vergano et al. 2020). Interestingly, the latest ICNARC (ICNARC 2020) data notes that the average age of those people invasively ventilated was 58.7 years, 25% were over the age of 69 years. 11.2% required some help with personal activities of daily living (ADLs) and 12% had a BMI >40 (and 36.1%, BMI 30–39) (Navaratnam et al. 2021). One of the greatest concerns is that people will be discriminated against and refused care purely by virtue of their chronological age, which is unjust and probably illegal, since age is a protected characteristic under the Human Rights Act 1998 (Human Rights Act 1988).

**Value judgments**

All people have intrinsic value, irrespective of other’s views or judgements; their life has value and meaning, and that life should be protected and respected in accordance with the fundamental requirement of justice. This does not mean, however, that all people should necessarily undergo cardiopulmonary resuscitation or be
offered life-sustaining treatments such as mechanical ventilation, if the likely outcome is the prolongation of dying rather than the extension of life (Ballantyne et al. 2020, Jones 2020).

Pandemic decision-making

The National Institute for Clinical and Health Care Excellence (NICE) has suggested that in making any decision, co-existing comorbidities and underlying health and functional status should be taken into account (NICE 2020). National guidance in planning for pandemic flu affirms that ‘equal concern and respect is the fundamental approach.’ (Guidance 2017). The BMA (2020) states, ‘in dangerous pandemics the ethical balance for all doctors and health care workers must shift towards the utilitarian objective of equitable concern for all, while maintaining respect for all as “ends in themselves”’ and the Royal College of Physicians (2020) advises ‘fairness is the best way to understand the ethical problem that clinicians are likely to encounter,... any guidance should be accountable, inclusive, transparent, reasonable and responsive.’ The GMC (2010) also states that patients are ‘approaching the end of life if death is likely in the next 12 months.’

Many of the assessments, for example SAPS III (Metnitz et al. 2005), SOFA (Ferreira et al. 2001) and APACHE II (Ho et al. 2007), employed by Critical Care physicians are undertaken in the first 24 h of admission to the Unit. None of these particularly utilizes functional status as a measure, but focus on organ function and comorbidities. Research has shown that the presence of comorbidities and increasing age correlates closely with worsening outcomes if patients are ventilated (Metnitz et al. 2005). However, the effect of age is attenuated once frailty, premorbid functional status and comorbidities are factored in (ICNARC 2020, Navaratnam et al. 2021). Hope et al. (2015) have shown that the presence of frailty increased the hazard ratio (HR) in Critical Care mortality by 1.27, in those >75 years over and above that expected. Pre-existing comorbidity is predictive of functional outcome from Critical Care, and an increase in the Clinical Frailty Scale (CFS) by 1 point is associated with an increased HR of death by 1.3 (McDermid et al. 2011).

The recent algorithm produced by NICE (2020) suggested using the CFS as part of the assessment for consideration of Critical Care Unit admission. A score of 5 was taken as the point when a discussion about the appropriateness of treatment escalation (cardiopulmonary resuscitation and ventilation) should commence.

COVID-19 is an unusual disease and currently has particularly poor outcomes compared to other causes of viral pneumonitis (ONS 2020) with multiple severe sequelae such as thrombosis, cardiomyopathies and other organ dysfunctions, all of which are poorly tolerated in those older and frailer patients (Lithander et al. 2020). Invasive mechanical ventilation is burdensome, exerting a huge physiological toll, such that even young patients ventilated for COVID-19 may take weeks to wean and extubate, require months of rehabilitation, and may never return to their prior state of health. Frail older patients have very limited physiological reserve and recovery to premorbid function is highly unlikely.
Scales and normal ranges are bedrocks of medical management, but focusing on numbers, and failing to take a more holistic approach may result in an inappropriate decision. When there are pressures on critical care due to increased demand or reduced availability of resources, it is not appropriate to use age as the sole determinant of access to treatment. Assessment of frailty, premorbid function and comorbidity burden is a better approach to prognostication.

**Conclusion**

Decisions around escalation to critical care for invasive organ supportive therapies need to be made by experienced clinicians, using a transparent and replicable process, individualized on a case-by-case basis, and be based on the probability of benefit versus harm, guided by robust evidence around outcomes (Intensive Care Society 2020). Consequently, many of the decisions around refusal to escalate to invasive ventilation, or other organ support, will be consistent with those decisions made outside the context of a pandemic and scarce resources, since likelihood of benefit (or lack thereof) will be similar.

Given the current evidence-base, the imperfect nature of medicine, and the need for the most effective use of healthcare resources, we advocate this holistic and individualized approach.

**Disclosure statement**

No potential conflict of interest was reported by the author(s).

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