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Allocating scarce intensive care resources during the COVID-19 pandemic: practical challenges to theoretical frameworks

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The COVID-19 pandemic strained health-care systems throughout the world. For some, available medical resources could not meet the increased demand and rationing was ultimately required. Hospitals and governments often sought to establish triage committees to assist with allocation decisions. However, for institutions operating under crisis standards of care (during times when standards of care must be substantially lowered in the setting of crisis), relying on these committees for rationing decisions was impractical—circumstances were changing too rapidly, occurring in too many diverse locations within hospitals, and the available information for decision making was notably scarce. Furthermore, a utilitarian approach to decision making based on an analysis of outcomes is problematic due to uncertainty regarding outcomes of different therapeutic options. We propose that triage committees could be involved in providing policies and guidance for clinicians to help ensure equity in the application of rationing under crisis standards of care. An approach guided by egalitarian principles, integrated with utilitarian principles, can support physicians at the bedside when they must ration scarce resources.

Introduction

During the first months of the coronavirus disease 2019 (COVID-19) pandemic, many health-care facilities and systems were overwhelmed by the number of patients and the need to provide the resources required to care for them.^{1–3} Demand outstripped supply for key medical resources, including sedative medications and personal protective equipment (PPE), as well as intensive care unit (ICU) staffing and beds. Furthermore, knowledge and information about effective treatments were both scarce and controversial at that time, rendering decisions regarding resource allocation even more difficult. Although every reasonable effort might have been made by administrators and clinicians alike to secure what was needed to treat each patient appropriately, there came a point in some health-care systems where this could no longer be achieved. In this situation, there was no choice but to ration, to control the distribution of scarce resources. However, early in the pandemic, generally accepted standards were not available in many places and some regulations and laws left clinicians feeling unsupported and even unable to implement high-quality care. Clinicians were left to make individual patient decisions on the basis of their own moral standards, leading to considerable moral distress. Meanwhile, patients, families, and the public experienced distress and even outrage at some of the decisions being made or proposals put forth to provide an ethical framework for such decisions. Across the world, this uncertainty played out in distinctly different ways, yet one thing is clear: even this far into the pandemic, we have yet to establish practical processes for the just rationing of scarce medical resources.

Pre-COVID-19 approaches to rationing scarce resources

Long before the COVID-19 pandemic, medical practitioners and ethicists debated the rationing of vital

resources.^{4,5} In addition, it should also be recognised that limit setting is a general feature of health care. Not only are resources always limited in some sense, but the distribution of resources between hospitals, regions, or countries is challenging and itself requires prioritisation and rationing decisions.⁶ Despite our daily decision making about the distribution of resources, the threat of dangerous and widespread shortages of essential resources for life-saving medical treatments in high-performing health systems, as occurred during the early months of the COVID-19 pandemic, has no parallel in modern times.

When the COVID-19 pandemic reached Europe and North America, recommendations and guidelines on ethical issues related to allocation and rationing of scarce resources were quickly developed—often on the basis of considerations from mass casualty events or previous pandemics.^{4,7–9} Such recommendations commonly suggested that responsibility for the direct care of

Key messages

- Institution-based triage committees should be developed to support the establishment of principles, structures, and procedures for the equitable allocation of scarce resources
- Triage committees should also have a key role in developing guidelines and standards for the distribution of scarce resources and providing support to bedside clinicians, but it might be impractical to expect that triage committees can make these individual decisions during the COVID-19 pandemic
- When operating under crisis standards of care in a situation like the COVID-19 pandemic, rationing decisions for individual patients will ultimately need to be made by the clinicians at the bedside guided by triage committees, available prognostic information, and both egalitarian and utilitarian principles

patients should be separated from responsibility for making rationing decisions to protect the clinician–patient relationship.^{5,10} With that principle in mind, triage committees were proposed. These committees would be in charge of both the rationing decisions—with information from clinicians at the bedside—and the communication of these decisions to patients or surrogates.^{11–14} However, thus far no systematic use of triage committees to make allocation decisions were put in place during the COVID-19 pandemic.¹⁵ The triage committee structure alone does not prescribe the approach to decision making: the values and principles upon which the triage decisions are made must also be defined.^{16,17}

Many of these recommendations and guidelines introduce, as the main criterion for rationing, the probability that an individual patient will survive and benefit from ICU treatment. In effect, this amounts to an attempt to maximise the number of patient lives saved, an aim well established in emergency medicine triage models. These approaches require that the triage committees have access to enough information about individual patients' chronic health conditions and acute illness to be able to provide an estimation of the prognosis with and without ICU treatment for each patient.⁴

Finally, we should consider the fact that triage decisions based on utilitarian principles are vulnerable to discrimination against disadvantaged people. Those who are poor and less educated suffer from worse health status and higher mortality, and they are therefore at a higher risk of serious disease when falling sick with COVID-19.^{18,19} Triage decisions based on maximisation of benefits would additionally disadvantage these individuals. Similar observations are true for those who are racially disadvantaged and for disabled people.^{20–22}

Challenges of the COVID-19 experience

During the initial months of the COVID-19 pandemic, although no systematic use of triage committees to make allocation decisions was put in place, our experiences suggest that the theoretical advantages of triage committees would not hold up under real life crisis conditions (figure). The specific intensive care resources that were scarce were highly variable over time (ICU beds in one moment, dialysis machines, ventilators, or some combination of these and other resources, only hours later) and occurred in multiple locations throughout the hospital: committee decisions could not keep up with this fluidity and pace.²³ Moreover, the complexity of decisions would have overwhelmed the capacity of such committees, which could undoubtedly reach a recommendation for how to allocate one ventilator when there are two patients in need at one point in time, but would struggle when there are, for instance, 120 such patients and only 90 ventilators available, with individual decisions stretched out over all hours of the day and multiple locations.²⁴ Furthermore, a triage committee approach

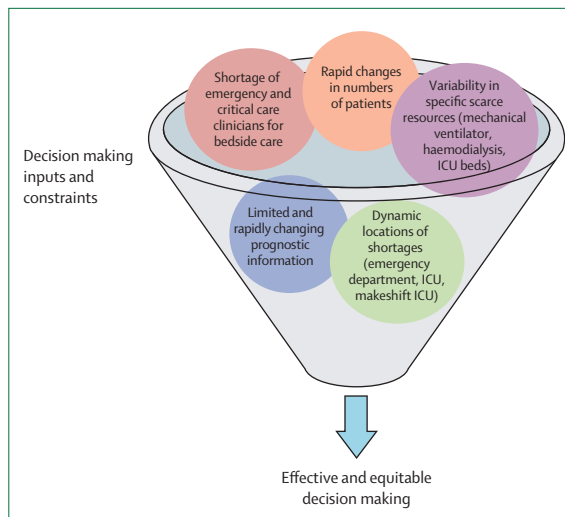


Figure: Decision making inputs and constraints
ICU=intensive care unit.

could paradoxically limit inventive strategies for extending resources, such as shorter dialysis sessions for more patients. Finally, ICU clinicians are crucial members of triage committees, but they were also some of the very resources in scarcity, indispensable for bedside patient care, seriously limiting their availability to participate in such committees, a point also highlighted by others.²⁵

Decision making based on an analysis of outcomes requires reasonably sound and valid prediction based on the specific context.²⁶ For COVID-19, the knowledge to assess the outcome of different therapeutic options is still limited and, in many areas, not sufficiently accurate due to lack of definitive data.²⁷ This is particularly true for highly resource-dependent ICU therapies, including dialysis, invasive mechanical ventilation, and extracorporeal membrane oxygenation (ECMO). Concerns about insufficient accuracy and lack of validity of outcome prediction in the context of patient triage have been raised previously, and are therefore not limited to COVID-19.^{28–30} More recently, we have gained considerable insights into the pathophysiology, clinical course, risk factors and therapeutic options for COVID-19, yet many open questions and serious uncertainties remain. Previously established clinical scoring systems for outcome prediction are not sufficiently accurate and validated in COVID-19 to be used in this process.^{16,31} It remains to be seen whether the 4C Deterioration model and the 4C Mortality Score might close this gap.^{32,33} Guidelines incorporating emerging evidence for COVID-19 treatments are rapidly evolving, which makes comparisons across patient groups much more complex. If predicting the outcome with sufficient accuracy for a specific patient compared with another patient competing for a scarce resource is not possible, the use of principles requiring inter-individual comparison of expected benefit for the purposes of rationing is likely to be extremely challenging.

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Moreover, a focus on net outcomes alone without incorporating individual, rights-oriented, egalitarian allocation criteria could appropriately lead to public outcry and serious legal challenges. To address these concerns with utilitarian principles in triage decisions, we recommend explicitly incorporating egalitarian principles into the decision-making process.

A COVID-19 informed approach: incorporating egalitarian principles for decision making

Egalitarian principles alone cannot resolve the many controversies related to rationing decisions in a crisis, but procedural rules based on these principles might help guide decisions about how to distribute limited ICU beds, ventilators, or ECMO treatments, if the number of patients in need substantially outnumbers available treatments.^{6,17,34,35} Applying principles promoting fair equality of opportunity might help policy makers, administrators, and clinicians guide medical teams when confronted with rationing decisions when operating under crisis standards of care (during times when standards of care must be substantially lowered in the setting of crisis), particularly for a complex, pervasive, and prolonged crisis, such as the COVID-19 pandemic. Such principles can be particularly relevant for allocating decisions when valid means of prognostication are lacking. Furthermore, they can also ensure equity for vulnerable populations, such as racial and ethnic minorities or people with disabilities.^{21,22,36} Weighing the

relevance and acceptance of different values and principles is a context-dependent process and is a matter for societal discussion and negotiation. Therefore, a universal triage protocol that finds equal acceptance in all societies is highly unlikely. Finally, these principles cannot determine when and by whom the decisions should be made. This is a challenging question made more challenging because decisions regarding intensive care treatment are often time sensitive to prevent further patient deterioration or even death (table).

Balancing the roles and responsibilities for rationing decisions

Governments, legislators, and health administrators have a responsibility to ensure that sufficient health-care resources are available to meet the needs of the population, taking into account that locally and temporally limited emergencies occur where the need for resources exceeds anticipatable needs. However, one cannot hold a government, legislature, or administration accountable for maintaining sufficient resources to meet all needs in an extreme crisis where there is a widespread and prolonged influx of patients. In this context, responsibility must be shared throughout the health-care system and society itself. Clinicians must be able to rely on support from professional societies, governmental agencies, and legislation tailored to the needs of the crisis.

When ICU beds, dialysis machines, ventilators, or ECMO treatments become scarce—before reaching a

Advantages		Disadvantages
Decision makers		
Triage committee	Separates allocation decision from clinical decision making, thereby relieving bedside clinicians and preserving the physician–patient relationship; providing a perspective without knowing the patient might enable more objective decision making	Lacks flexibility when resource limitations are rapidly changing; consumes crucial resources, such as physicians, nurses, and other staff needed at bedside
Bedside physician-led decision making	Allows for an informed decision being made on the basis of first-hand knowledge of the patients	Limited to the patients cared for by the physician; limits ability to fully incorporate system-wide constraints or resource limitations; outcomes cannot be maximised across patients in the hospital or region
Principles for decision making		
Maximisation of benefits (utilitarian principles)	Maximises given outcome across a population—eg, most life-years or quality adjusted life-years saved	Might come into conflict with individual rights-based (egalitarian) principles; depends on predictions of outcomes, the data for which might be scarce or flawed; difficult to implement in a chaotic, pervasive pandemic; vulnerable to discrimination against disadvantaged people (the poor and less educated, racially disadvantaged, and disabled people)
Individual rights (egalitarian principles)	Respects the individual and takes seriously the distinction between persons; more feasible to incorporate in a chaotic, pervasive pandemic	Does not safeguard efficient distribution of resources across a population
Decision making based on instrumental value	Rewards and preserves those who provide valuable assets to society during a pandemic	Difficult to fairly judge individuals' value; vulnerable to discrimination against those with less opportunity to provide a given value
Maximise number of lives saved	Combines utilitarian aspects (number of lives) and egalitarian convictions (each life counts, regardless of its quality or societal benefit)	Depends on predictions of outcomes, the data for which might be scarce or flawed; difficult to implement in a chaotic, pervasive pandemic
Priority to the worst off	Those in danger of rapid deterioration will be treated first	Potential waste of scarce resources on those who cannot be saved
First-come, first-served	Treats people equally, does not presuppose prediction of treatment outcomes	Likely to benefit individuals from higher socioeconomic backgrounds, who are mobile, and who are well informed, and to disadvantage poor and disabled people; likely to give priority to the frailest patients (who probably suffer from serious courses of the disease first) thus prohibiting admissions of the young and otherwise healthy who would come later in the disease period; does not safeguard efficient distribution of resources across a population
Lottery	Treats people equally, avoids bias, does not presuppose prediction of treatment outcomes	Does not safeguard efficient distribution of resources across a population; unlikely to be acceptable to clinicians, patients, and family members

Table: Advantages and disadvantages of different decision makers and principles used for rationing decisions when intensive care unit resources become scarce

stage of rationing—basic principles that guarantee most effective use of available resources must be meticulously followed: non-essential interventions and operations must be postponed or abandoned, patients who are highly likely to die even with life-sustaining treatment or patients who do not require ICU-level treatment should not be admitted to the ICU; patients should be discharged from the ICU as soon as their care can be adequately provided outside of an ICU setting; equipment should be reused or repurposed whenever safe and feasible; ICUs across a region or country should cooperate and share resources; and nurses, physicians, respiratory therapists, and other essential ICU staff should expect to care for a higher number of patients than usual.³⁷ These measures will help stretch available resources and effectively increase the number of ICU beds and therapies available, while minimising the impact on the overall quality of care.

Role of triage committees

Triage committees should have a key role in the development of guidelines, procedures, and structures. However, experience during the early COVID-19 pandemic suggests that these committees would not be able to be flexible, nimble, and comprehensive enough to be responsible for all bedside decisions as they arise 24 h a day and throughout the hospital, including the emergency department, acute care wards, traditional ICUs, and makeshift ICUs. In the right context, such committees could unburden treating clinicians from rationing decisions directly affecting their patients, but the COVID-19 pandemic is not such a context.

Triage committees should nonetheless have a key role in helping an institution develop policies on how to distribute resources for different treatments and interventions based on expected numbers of patients with specific medical conditions and needs. These policies and recommendations must consider and balance morally relevant competing demands and interests (eg, ECMO treatment, compared with invasive mechanical ventilation alone, requires higher staffing ratios, which might limit resources available for other patients).^{13,14,37,38} Furthermore, triage committees could develop policies and recommendations that help institutions address the racial and ethnic disparities that have been so notable in the COVID-19 pandemic and actively discourage biased decision making, whether explicit or implicit.²²

Triage committees, similar to clinical ethics committees, might set standards and guidelines based on the principles for rationing decisions we have discussed. Such committees can give guidance even when they might not be able to practically adjudicate every individual treatment decision for all patients. These decisions are probably best to be made and justified by the responsible treating physician on the basis of the principles described here and the requirements and guidelines established by a triage committee. In addition, triage committees

could be available for consultation for particularly difficult situations.

Conclusion

Triage committees and principles requiring reliable prognosis, including utilitarian principles, were insufficient for rationing decisions during the COVID-19 pandemic when ICU beds, ICU staff, and other resources became scarce on an unprecedented scale. Triage committees can have a valuable role in setting standards to guide and support rationing decisions. These standards should take account of the difficulties of predicting individual treatment outcomes and explicitly include egalitarian principles. In a context such as the early COVID-19 pandemic, triage committees might not be able to take over responsibility for decision making for all patients. In such a context, this task will likely need to remain with the clinicians at the bedside, with the support of triage committees and guided by a combination of egalitarian and utilitarian principles.

Contributors

AS wrote the first draft of the manuscript. All co-authors revised the manuscript and added key content. All co-authors read and approved the final manuscript.

Declaration of interests

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