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Allocating Scarce ICU Resources During Public Health Emergencies: Principles Revisited

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ABSTRACT

The COVID-19 pandemic forced hospitals to operationalize, for the first time at scale, crisis-standards-of-care frameworks that had previously existed mostly on paper, exposing wide variation in how allocation principles for scarce ICU resources were actually implemented.

This review revisits the classical bioethics literature on scarce-resource allocation -- equality, utility, and priority to the worst off -- and traces how these principles fared once translated into ventilator and ICU-bed triage protocols during real surges.

It examines the sustained disability-rights critique of prognosis-based and quality-adjusted-life-year-adjacent scoring tools, and the parallel debate over whether weighting life-years saved is a defensible refinement of utilitarian allocation or an invitation to discriminate.

We also consider procedural safeguards -- independent triage teams, staged reassessment, and public engagement in drafting criteria -- that emerged from the pandemic experience as arguably as important as the substantive principle a jurisdiction adopts.

We conclude that no single allocation principle has been vindicated by the pandemic experience, but that the crisis-standards documents judged most defensible in retrospect combined workable clinical scoring with explicit non-discrimination safeguards and a transparent, revisable process.

Keywords: resource allocation; ICU triage; crisis standards of care; disability rights; public health ethics

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INTRODUCTION

For most of its history, intensive care triage was an operational problem rather than a public one --

something worked out quietly between clinicians, hospital ethics committees, and the occasional disaster plan that few outside the institution ever read. COVID-19 changed that almost overnight. When

hospitals in northern Italy, New York City, and elsewhere reported having to choose which patients would receive a ventilator and which would not, allocation frameworks that had been drafted years earlier as contingency documents suddenly became the subject of public scrutiny, legal challenge, and disability-rights litigation [1]. A 2020 systematic review of crisis standards of care documents across US states found wide variation in the principles states had adopted, in how explicitly those principles were operationalized into scoring tools, and in whether the documents had been stress-tested against anything resembling a real surge [1].

That variation was not merely bureaucratic untidiness. It reflected a genuine and still partly unresolved disagreement in the underlying bioethics: whether scarce critical-care resources should be allocated to save the most lives, the most life-years, the patients with the best prognosis, the patients who arrived first, or some weighted combination of these, and whether any of these criteria can be applied without quietly disadvantaging people with disabilities or chronic illness [2,3]. This review revisits the major allocation principles that framed the pre-pandemic literature, examines how they held up -- or did not -- once crisis standards of care were actually implemented, and considers what has changed in the ethical consensus since. Table 1 summarizes the principal allocation criteria discussed below, and Figure 1 offers an illustrative comparison of how heavily each criterion has been emphasized across recent crisis-standards frameworks.

THE CLASSICAL FRAMEWORK: UTILITY, PRIORITY, AND EQUALITY

Long before COVID-19, a small bioethics literature had already mapped out the major candidate principles for allocating scarce, life-saving interventions. A widely cited 2009 framework organized these into four families: treating people equally (for instance, by lottery or first-come-first-served), favoring the worst off, maximizing total benefits, and promoting and rewarding social usefulness [2]. The authors argued that no single principle survives scrutiny on its own -- pure equality ignores the fact that outcomes differ enormously depending on who receives the resource, while pure utility maximization risks treating some lives as worth less than others -- and proposed a "complete lives" system that weighs prognosis, life-stage, and a modest lottery element together [2]. That proposal was itself contested for effectively encoding age discrimination, but it succeeded in reframing the debate: subsequent guidance documents rarely defend a single pure principle, instead combining elements from several.

When crisis standards of care were actually drafted for pandemic use, most converged on some version of a "save the most lives, then the most life-years" hierarchy, often operationalized through a sequential

organ failure assessment (SOFA) score or a similar short-term mortality prediction tool, sometimes combined with a tie-breaking preference for younger patients or health-care workers [4,5]. The Centers for Disease Control and Prevention's ethical guidance for ventilator allocation during a severe pandemic likewise emphasized saving the most lives and life-years as the dominant consideration, while explicitly cautioning against categorical exclusions based on disability or age alone [6]. In practice, though, the tools used to estimate short-term mortality were themselves imperfect predictors, particularly across different underlying conditions, which meant that a framework designed to be principle-neutral on its face could still produce systematically different outcomes for different patient populations [7]. Clinical commentaries on ventilator triage specifically warned that many hospital protocols borrowed scoring thresholds from unrelated clinical contexts without validating them against the acute presentations a pandemic surge would actually produce [8].

Table 1. Principal criteria proposed for allocating scarce ICU resources, compared by theoretical justification, ease of clinical implementation, and exposure to fairness objections.

Criterion	Theoretical justification	Ease of clinical implementation	Main fairness objection
Lottery / first-come, first-served	Formal equality among patients	Easy to apply, but ignores prognosis differences	Can waste resources on patients unlikely to benefit
Save the most lives (short-term prognosis)	Utilitarian: maximize survivors	Requires a validated mortality-prediction tool	Prediction tools may be less accurate for some conditions or populations
Save the most life-years	Utilitarian: maximize total benefit over time	Requires long-term prognosis estimates, harder to validate acutely	Risks systematically deprioritizing older or chronically ill patients
Priority to the worst off / instrumental value	Egalitarian or reciprocity-based	Requires judgment calls (e.g., health-care worker status)	Criteria for 'worst off' or 'instrumental value' are contestable and can be applied inconsistently
Prognosis with disability/discrimination safeguards	Combines utility with explicit non-discrimination constraints	More complex protocol design and staff training	Still relies on prognosis tools whose neutrality is contested

CRISIS STANDARDS IN PRACTICE: WHAT THE PANDEMIC REVEALED

The gap between a well-reasoned ethics framework on paper and an allocation protocol that a tired triage officer can actually apply at 3 a.m. during a surge turned out to be one of the pandemic's sharper

lessons. A JACC review of scarce-resource allocation during COVID-19 catalogued how widely hospital systems diverged in practice, even within a single country working from broadly similar ethical premises, because the scoring tools, exclusion criteria, and appeals processes each institution built differed in ways that were not obvious from the underlying principles alone [9]. A parallel review of ventilator triage policies specifically found similar heterogeneity: some states published detailed scoring algorithms, others left the operational detail almost entirely to individual hospitals, and a substantial minority had no publicly available protocol at all when the first pandemic wave hit [10].

Figure 1. Schematic illustration of how emphasis on different ICU allocation criteria appears to have shifted between early pandemic guidance and revised guidance issued after the first pandemic wave, based on the qualitative pattern described in the crisis-standards literature reviewed here. Values are illustrative on a relative 1-5 scale and are not drawn from a single quantitative study.

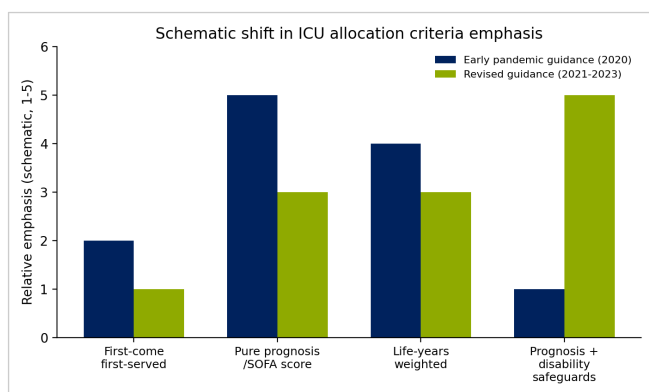


Table 1 summarizes how several of the most commonly cited allocation criteria compare on their theoretical justification, ease of clinical implementation, and exposure to fairness objections. Figure 1 illustrates, schematically, how emphasis on these criteria appears to have shifted across the crisis-standards documents reviewed in the literature discussed here -- moving, in the years after the first pandemic wave, away from purely prognosis-based scoring and toward frameworks that build in explicit safeguards against inadvertent discrimination.

Public attitudes surveys conducted during the pandemic offered a useful reality check on how far these expert frameworks tracked lay moral intuitions. A survey of US public opinion found broad support for prioritizing health-care workers and for using a lottery when prognosis was equivalent, but much more divided views on using age or long-term life expectancy as explicit tie-breakers -- suggesting that some of the criteria bioethicists treated as settled were considerably more contested among the public whose resources were actually being allocated [11]. Practical ethics guidance developed by individual health systems, such as the University of Vermont Health Network's ventilator allocation policy, tried to bridge this gap by pairing a mortality-based scoring tool with

an independent triage team insulated from the treating clinician, on the reasoning that even a defensible principle needs a defensible process to be trusted [12].

THE DISABILITY-RIGHTS CHALLENGE

The most sustained ethical criticism of pandemic-era crisis standards came from disability-rights scholars and advocates, who argued that "save the most life-years" criteria, however neutral they appeared on paper, systematically disadvantaged people with chronic illness or disability by treating their baseline health status as a reason to deprioritize them for an unrelated acute illness [13]. A widely read Hastings Center Report argued that disability rights needed to be built into crisis standards of care as a starting framework rather than bolted on afterward as a correction, because by the time a triage protocol reaches a bedside decision, it is too late to unwind assumptions baked into the scoring tool itself [13]. A companion piece from the same institution went further, arguing that disability rights law prohibits considerably more than overt prejudice -- it also constrains facially neutral criteria that produce a disparate effect on people with disabilities, a legal theory that several federal civil-rights complaints against state crisis-standards documents invoked directly [14].

Some of this criticism specifically targeted the quality-adjusted life year (QALY), a metric long used in health-technology assessment and occasionally proposed for triage, on the grounds that it structurally values a year of life lived with disability as worth less than a year lived without it. A widely cited response argued that much of this critique, while capturing a real risk of misapplication, misdirects its target: a properly specified QALY framework need not encode disability discrimination, and the discrimination concern is really an argument about how outcome measures are elicited and weighted rather than an indictment of cost-effectiveness analysis as such [15]. That exchange has not been resolved so much as it has clarified where the actual disagreement lies -- not over whether disability status should be used as an explicit exclusion criterion (virtually no one defends that), but over whether prognosis-weighted allocation tools can ever be fully purged of the same underlying assumptions the QALY critique targets.

A New England Journal of Medicine commentary published early in the pandemic tried to stake out a middle position, arguing that crisis triage could optimize health outcomes and still respect disability rights, provided protocols excluded long-term prognosis and quality-of-life judgments unrelated to the immediate crisis, relied on individualized clinical assessment rather than categorical diagnosis-based exclusions, and built in a mechanism for reasonable accommodation during triage itself [16]. That framing has been influential in the revisions many state crisis-standards documents underwent after the first

pandemic wave, several of which explicitly removed diagnosis-based exclusion lists that earlier drafts had included [17].

LIFE-YEARS, FAIRNESS, AND THE RETURN OF THE UTILITARIAN OBJECTION

Even after allocation frameworks moved away from explicit long-term prognosis, a second-order dispute persisted over the narrower question of short-term life-years -- that is, whether a framework should count a patient's near-term probability of surviving the acute illness only, or should also weight how many additional years of life a successful discharge is likely to yield. A policy brief associated with a university center for antiracist research argued that "social justice" triage principles, in trying to avoid disability and age discrimination, sometimes swing to the opposite extreme of ignoring life-years saved altogether, which the authors argued has its own distributive costs when resources are genuinely scarce [18]. Emanuel and colleagues, in an influential early-pandemic proposal, defended weighing both immediate survival probability and instrumental value (for example, prioritizing health-care workers whose recovery lets them return to treating others) as compatible with, rather than opposed to, an egalitarian commitment to treating all patients as having equal moral worth [5].

Sequential, staged frameworks that revisit an initial exclusion or prioritization decision at fixed clinical checkpoints -- reassessing prognosis every 48 to 72 hours rather than making a single irreversible allocation decision at admission -- were proposed partly to answer this critique, on the reasoning that a process which remains open to revision as new clinical information arrives is fairer to any given patient than a single static score computed at the point of greatest uncertainty [19]. Economic modeling of triage protocol design has reached a related conclusion from a different direction, arguing that dynamically updated allocation rules outperform static, one-time scoring on both efficiency and fairness grounds when patient arrivals and outcomes are uncertain [20]. Whether these staged models were actually implemented as designed, rather than existing mainly on paper, is one of the questions the post-pandemic literature has been more candid about than the initial guidance documents were: several reviews of actual triage practice during the worst surges found that formal reassessment protocols were inconsistently followed, often because the staffing crisis that made triage necessary in the first place also made rigorous, scheduled reassessment difficult to sustain [21].

Philosophical commentary written closer to the height of the pandemic pushed back against treating any of these frameworks as fully settled. One widely discussed piece described the choices facing triage officers as genuinely tragic rather than merely difficult -- cases in which every available option involves a serious moral cost, and where bioethics can clarify the

trade-offs without pretending to dissolve them [22]. That framing is a useful corrective to guidance documents that sometimes read as though a sufficiently well-designed scoring algorithm could make triage ethically costless; survey work on the moral judgments clinicians themselves bring to triage decisions found that individual practitioners' intuitions often diverged from the formal principle their institution's protocol claimed to implement, underscoring how much of the ethical work happens in interpretation rather than in the written policy [23]. The emerging consensus, if there is one, is closer to the view that a legitimate process -- transparency, independent review, appeal mechanisms, and public engagement in drafting the criteria beforehand -- matters at least as much as which substantive principle a jurisdiction ultimately adopts [24,25,26].

CONCLUSION

Ten years of pre-pandemic bioethics scholarship on scarce-resource allocation converged on the modest conclusion that no single principle -- pure equality, pure utility, or pure priority to the worst off -- survives close scrutiny on its own. COVID-19 tested that conclusion under real operational pressure and largely confirmed it: the crisis standards of care that fared best in retrospective ethical and legal review were not the ones built around the theoretically cleanest single criterion, but the ones that combined a workable clinical scoring tool with explicit safeguards against disability discrimination, an independent triage process insulated from bedside clinicians, staged reassessment rather than one-shot decisions, and some form of public input into the criteria before a crisis made their application urgent. The disability-rights critique of prognosis-based and QALY-adjacent scoring tools has not been resolved so much as absorbed into revised guidance, most of which now explicitly disclaims long-term quality-of-life judgments as a basis for acute triage. What remains open, and is likely to remain open through the next public health emergency, is the harder question the life-years debate keeps returning to: how far a system can go in acknowledging that outcomes differ across patients without that acknowledgment sliding into exactly the kind of categorical devaluation the disability-rights literature was right to warn against.

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Conflict of Interest

The authors declare no conflicts of interest relevant to

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Author Contributions

Vaclav Novak conceived the review, drafted the sections on classical allocation principles and crisis standards in practice, and coordinated the manuscript. Sofia Halvorsen developed the disability-rights and QALY sections and critically revised the manuscript for content and structure. Jakub Georgiou contributed the analysis of life-years, fairness, and procedural safeguards, and provided final approval of the submitted version. All authors read and approved the final manuscript.

Ethics Statement

As a literature review synthesizing previously published, publicly available research, guidance documents, and policy analysis, this article did not involve new data collection from human participants and did not require institutional ethics committee approval.

Data Availability

No new data were generated or analyzed for this review. All sources discussed are cited in the reference list and are publicly available through their respective publishers or issuing institutions.

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