



Invited Commentary | Critical Care Medicine

Improving Ventilator Rationing Through Collaboration With Experts on Resource Allocation

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As the coronavirus disease 2019 pandemic evolves, questions regarding the fair allocation of scarce medical resources, such as ventilators, antiviral drugs, and vaccines, abound. Piscitello et al¹ provide a valuable summary of US state ventilator allocation guidelines during public health emergencies. Even if guidelines for ventilators have not been widely implemented during the current pandemic, the principles they articulate are an important statement of social values. The variation among guidelines that Piscitello et al¹ uncovered suggests that there is no consensus on the adequate balance between different ethical considerations.

In their summary, Piscitello et al¹ did not focus on the process by which guidelines are crafted and ethical compromises are reached. Most guidelines are established through consultation with experts from medicine, ethics, and the law. Medical expertise can be valuable for describing constraints associated with triage protocols in the field and for evaluating clinical criteria, such as the use of sequential organ failure assessments. Clinical criteria are part of ventilator allocation in several state guidelines, including those that emphasize goals such as saving the most lives or life-years. Ethicists can help to propose and adjudicate among different principles, such as reciprocity or instrumental valuation. Legal scholars can ensure that guidelines survive legal challenges, including those having to do with nondiscrimination.

In our study of ventilator rationing guidelines,² we have not seen task forces include input from experts on market design, a field of economics that studies the allocation of scarce resources. In many settings, price plays a central role in allocation when demand exceeds supply; however, this instrument is often not available in public health emergencies with extreme scarcity. During the last 2 decades, substantial research activity and policy developments have taken place regarding allocation environments where price-based tools are either unavailable or considered repugnant. Two noteworthy examples are the organization of kidney exchanges in the US and the assignment of seats at public schools. Because research in market design incorporates ethical considerations and operationalizes these objectives with an allocation mechanism, scholars in this field can be valuable for transforming various trade-offs between ethical principles into specific allocation procedures.

Piscitello et al¹ emphasize differences among ventilator guidelines in the treatment of exclusion criteria, priority for specific groups, and withdrawal of mechanical ventilation. They also emphasize scoring systems and the question of the appropriate type of scoring system for pediatric patients. Our view is that the absence of consensus among guidelines highlights the importance of questions of implementation. Inadequate attention to implementation issues may result in the abandonment of some goals, sometimes unintentionally.

Our study² illustrated the advantage of considering the perspective of allocation experts in the design of rationing protocols. Although our focus was not solely on ventilators, we proposed a reserve system to ensure that no ethical principle is ignored when allocating scarce medical resources. In a reserve system, units of the scarce resource are divided into categories, and category-specific prioritization is used for units of a given category. For example, some units may use age or chronic conditions to determine priority, while others may not. This flexibility helps to achieve a balance between different stakeholders without needing to completely reject certain principles. Our study² provides examples for debates on prioritizing essential personnel or protecting the rights of patient groups with disadvantage or disability.

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Reserve systems are used in other settings when there is no consensus on which principles should guide allocation. In medicine, following a multiyear community outreach process, the Organ Procurement and Transplantation Network introduced a reserve system for deceased-donor kidney allocation in 2014. The new mechanism provides preferential treatment to patients with the highest expected benefit for 20% of the highest-quality kidneys.

Outside of medicine, there are several examples of reserve systems. In 2005, the US Congress created an advanced-degree reserve consisting of 20 000 H1-B visas for applicants with masters degrees or equivalents.³ In 2009, Chicago Public Schools replaced their system of racial quotas for examination high schools with a reserve system, in which each neighborhood is placed into 1 of 4 tiers based on socioeconomic characteristics.⁴ At each school, 17.5% of seats are reserved for applicants based on neighborhood of residence and the remaining 30% of seats are open to all.⁴ Applicants are ordered based on their admissions score within each category. In 1999, following long-standing debates between factions favoring school assignment by neighborhood and those favoring school choice, Boston's school assignment system established a reserve system in which half of school seats are reserved for applicants from the school's walk zone.⁵ Applicants are ordered by a random lottery number in each group. Finally, a reserve system was developed as part of India's affirmative action system after more than a decade of community involvement, summarized in the 1979 Mandal Commission Report and formulated in the landmark 1992 *Indra Sawhney* Supreme Court case.⁶

These examples show that reserve systems are a common way to arrive at a compromise between different stakeholders. In some of the examples, some units prioritize applicants using random lotteries while others prioritize applicants using nonrandom criteria, such as test scores. The research on these systems shows how issues such as the reserve processing order can have unexpected consequences. These facts suggest the value of greater interaction between allocation experts and the groups designing rationing guidelines in medicine.

Most of the state guidelines studied by Piscitello et al¹ were written when the rationing of ventilators was still largely an abstract idea. Hopefully, their work will motivate greater attention to rationing guidelines for resources other than ventilators, such as vaccines and therapeutic drugs, that may require additional considerations and may be implemented in the near future.

ARTICLE INFORMATION

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REFERENCES

1. Piscitello GM, Kapania EM, Miller WD, Rojas JC, Siegler M, Parker WF. Variation in ventilator allocation guidelines by US state during the coronavirus disease 2019 pandemic: a systematic review. *JAMA Netw Open*. 2020;3(6):e2012606. doi:10.1001/jamanetworkopen.2020.12606
2. Pathak PA, Sönmez T, Ünver MU, Yenmez MB. Triage protocol design for ventilator rationing in a pandemic: integrating multiple ethical values through reserves. Published April 2020. Accessed June 1, 2020. <https://econpapers.repec.org/paper/nbrnberwo/26951.htm>
3. Pathak P, Rees-Jones A, Sönmez T. Immigration lottery design: engineered and coincidental consequences of H-1B reforms. Published February 2020. Accessed June 1, 2020. nber.org/papers/w26767
4. Dur U, Pathak P, Sönmez T. Explicit vs. statistical preferential treatment in affirmative action: theory and evidence from Chicago's exam schools. *J Econ Theory*. 2020;187(May):106996. doi:10.1016/j.jet.2020.104996

5. Dur U, Kominers S, Pathak P, Sönmez T. Reserve design: unintended consequences and the demise of Boston's walk zones. *J Polit Econ*. 2018;126(6). doi:[10.1086/699974](https://doi.org/10.1086/699974)
6. Sönmez T, Bumin Yenmez M. Affirmative action in India via vertical and horizontal reservations. Updated October 2019. Accessed June 1, 2020. <http://fmwww.bc.edu/EC-P/wp977.pdf>