COVID-19

The fairness of ventilator allocation during the COVID-19 pandemic

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Abstract
There is ongoing debate on how to fairly allocate scarce critical care resources to patients with COVID-19. The debate revolves around two views: those who believe that priority for scarce resources should primarily aim at saving the most lives (SML) or at saving the most life-years, and those who believe that public health should focus on health equity to address health disparities and social determinants of health. I argue that maximizing medical outcomes by saving the greatest number of patients is not a plausible strategy for combating COVID-19. There are reasons of fairness to give each patient who can meet general eligibility requirements a chance of being saved. Rather than focusing on outcome maximization, a better solution would be the individualist lottery that takes account of probability of survival and duration of treatment. Although the individualist lottery allocates scarce resources in a fair way that is responsive to health equity concerns, it still gives considerable weight to the concern of SML. Thus, this procedure can be reasonably accepted by all key stakeholders.

KEYWORDS
COVID-19, fairness, the individualist lottery, ventilator allocation

1 INTRODUCTION

The coronavirus disease-2019 (COVID-19) pandemic has affected healthcare systems worldwide, leading to a reduction of available healthcare resources and a reorganization of medical activities. Due to the lack of efficacious treatments, the pandemic will continue to be a serious public health menace with new challenges emerging as the pandemic progresses, particularly in developing countries that struggle to provide their populations with adequate services.1 The way the pandemic develops will depend to a large extent on the global availability of safe and effective vaccines and the spread of variants of concern of SARS-CoV-2 (VOCs).2 While many national

vaccination programs have now begun, it will take a long time to vaccinate whole populations and achieve global control of the pandemic.3 The demand for critical care resources may outstrip the supply in possible future waves of COVID-19.4 The ethical question to be considered is what criteria and processes should be adopted to allocate scarce resources for patients simultaneously becoming critically ill during these challenging times.

Triage of scarce resources forces us to face the uncomfortable fact that some individual patients will be denied lifesaving care that would normally be delivered to them under standards of

1Zarocostas, J. (2021). What next for a COVID-19 intellectual property waiver? The Lancet, 397(10288), 1871–1872.
2Forni, G., & Mantovani, A. (2021). COVID-19 vaccines: Where we stand and challenges ahead. Cell Death & Differentiation, 28(2), 626–639.
3Wouters, O. J., Shadlen, K. C., Salcher-Konrad, M., Pollard, A. J., Larson, H. J., Teertswattananon, Y., & Jit, M. (2021). Challenges in ensuring global access to COVID-19 vaccines: Production, affordability, allocation, and deployment. The Lancet, 397(10278), 1023–1034.
4Schulte, M. J., Neto, A. S., & Paulus, F. (2021). Battling COVID-19-related mortality: From a fight for ventilators to a cry for oxygen. The Lancet Respiratory Medicine, 9(9), 939–941. https://doi.org/10.1016/s2213-2600(21)00267-8
care. In public health emergencies, it seems ethically justifiable to shift the focus from regular standards of care to crisis standards, where physicians’ duty is primarily to improve and safeguard population health. How to identify the patients who have access to scarce resources is an important challenge that will emerge in different guises throughout the pandemic.

Some of the most influential work on COVID-19 has focused on saving the most lives (SML) or on maximizing life-years saved. Conventionally, triage prioritizes medical utility by providing resources only to those who will not survive without them and favoring those who are most likely to survive with their use. For instance, clinicians use ethical principles to balance the needs of individuals while still maintaining the benefits of populations. During a pandemic, outcome maximization is usually considered a “consensus” among experts. This dominant view acknowledges the importance of maximizing medical outcomes by either SML by allocating scarce resources to those most likely to survive to hospital discharge, or saving the most life-years by prioritizing younger patients or those with better prognosis. The concern of fairness can be taken seriously only when it does not directly conflict with the goal of maximizing outcomes.

However, it may be argued that the nature of COVID-19 and the “debate about balancing equity and efficiency” in the history of bioethics does not support the above consensus, since there are many “balancers who prefer distributions that give weight to both equity and efficiency.” Even in the arena of organ transplantation, facing the same problem of scarcity, the focus on outcome maximization has to be balanced by some other factors such as prior live organ donors and time spent on the waiting list. It is fair to say that critical care triage is influenced by “values beyond utilitarianism,” which have already been embedded within standards of care. But it seems also fair to say that the notion of fairness is not yet a full-fledged language for a deeper understanding of conceptual framework works of public health ethics. Some critics even question the capacity of mainstream bioethics to respond to large-scale pandemics like COVID-19, since the prevailing conception of the ethics of scarce resource allocation is insensitive to the circumstances of justice, but excellent on maximizing benefits.

Discussions on appropriate criteria and processes for scarce resource allocation during a pandemic are not novel. Many are reluctant to give due consideration to health equity or fairness. For some reason, SML, sometimes with saving the most life-years, continues to remain the primary goal of triage protocols. But it does not mean there is no longer a need to place restrictions on the way in which SML may be achieved. I argue that an ethically sound response to COVID-19 must take fairness into account while at the same time enabling the efficient allocation of scarce resources.

It is not my argument that current triage protocols reject fairness as a value criterion for resource allocation. New York’s 2015 Ventilator allocation guidelines is a guidance on how to ethically allocate ventilators during a pandemic while SML. On the one hand, the Guidelines select patients on the basis of likelihood of survival. The limited ventilators should be directed to those most likely to survive. On the other hand, the Guidelines also suggest that a fair allocation procedure should be used to decide what to do in conflict situations, where there are no evidence-based data available to triage patients for ventilation therapy. It seems that the Guidelines contain two moral values: SML and fairness. Nevertheless, the question I am trying to answer is how much weight to give to fairness, and what allocation methods to use in the pandemic.

2 | SML

A variety of ventilator protocols target on SML. Some recommend that patients should be prioritized based on predicted mortality risk, defined as a patient’s short-term likelihood of surviving the acute acceptable candidates. See Glazier, A. K. (2018). The lung lawsuit: A case study in organ allocation policy and administrative law. Journal of Health & Biomedical Law, 14, 139–148. Reid, op. cit. note 12; Bruce, L., & Tallman, R. (2021). Promoting racial equity in COVID-19 resource allocation. Journal of Medical Ethics, 47(4), 208–212. Sayeed, S. A., & Taylor, L. (2021). A pandemic induced reckoning: Bioethics and justice. University of Toronto Medical Journal, 98(1), 13–16. Biddison et al., op. cit. note 6; Persad, G., Wertheimer, A., & Emanuel, E. J. (2009). Principles for allocation of scarce medical interventions. The Lancet, 373(9661), 423–431; White, D. B., Katz, M. H., Luce, J. M., & Lo, B. (2009). Who should receive life support during a public health emergency? Using ethical principles to improve allocation decisions. Annals of Internal Medicine, 150(2), 132–138; Biddison, E. L. D., Faden, R., Gwon, H. S., Mareiniss, D. P., Regenberg, A. C., Schoch-Spana, M., Schwartz, J., & Toner, E. S. (2019). Too many patients... A framework to guide statewide allocation of scarce mechanical ventilation during disasters. Chest, 155(4), 848–854. Emanuel et al., op. cit. note 7; White & Lo, op. cit. note 7. Reid, L. (2020). Triage of critical care resources in COVID-19: A stronger role for justice. Journal of Medical Ethics, 46(8), 526–530. Ibid: 526–527. Prior live organ donors will be given preferential access to newly available organs, and time spent on the waiting list can make those who are marginally less likely to benefit become...
episode. Others take into account a patient’s long-term prognosis related to chronic conditions or disabilities. Generally, the triage process in a crisis situation typically proceeds in three steps: (a) applying exclusion criteria (if any), such as end-stage organ disease, metastatic neoplasm, and severe dementia; (b) estimating mortality risk on the basis of the Sequential Organ Failure Assessment (SOFA) score or other scoring systems to determine priority for allocation, and re-evaluating periodically to remove patients from ventilators if their condition is not improving; (c) using a tiebreaker (lotteries, first-come first-served, age, or the role of healthcare workers) for decision-making when the demand from a given priority group is greater than the available ventilators.

SML can mean different things in clinical practice, depending on the contexts in which it is implemented. In practice, SML is mainly concerned with assigning priority to patients who are most likely to benefit from treatment or who require less time on it. The requirement of SML is thus bifurcated into two parts: (a) saving the patients with a higher probability of survival, and (b) favoring those for whom estimated duration of treatment will likely be shorter. To facilitate discussion, consider a choice between saving patients with an 80% probability of survival (Group A) and saving patients with a 20% probability of survival (Group B). Suppose the duration of treatment for each patient keeps constant. It means, for every 100 patients, 80 patients will be saved from Group A, and 20 patients will be saved from Group B. Efficiency in this case is not “abstract gains in welfare or economic productivity,” but more people being saved.

The primary problem with SML is that scoring systems for predicting mortality for patients with COVID-19 are not perfect. The use of a scoring system as a marker of probability of survival during a pandemic has been advocated by many commentators. Most allocation protocols use SOFA scores or modified SOFA (MSOFA) scores to predict critical care outcomes. They aggregate several data types and generate an overall score based on the severity of patients’ conditions. Although SOFA-type scoring systems may be helpful for lessening the psychological burden placed on clinicians and triage teams, they are often criticized for insufficient validation, lacking precision, and neglecting health equity concerns.

First, the use of SOFA scores in COVID-19 is questionable. Some studies find that SOFA scores cannot predict mortality risk in a robust way for patients in ICU or in previous pandemics like the H1N1 influenza pandemic. If it is not certain that SOFA is sufficient in and of itself for decision-making, there is a need to incorporate discernment and judgment of medical professionals into triage protocols. This suggests that triage decisions need not depend solely on scoring systems. Second, the prognostic accuracy of SOFA is not as good as expected. It does not perform very well for patients with lower scores indicating poorer functioning and greater symptom severity.

The second problem is that although it strives to exclude ethically irrelevant factors such as patient race, gender, religion, and political beliefs from the decision-making process, it may compound the existing injustice of health disparities. The supporters of SML believe that eliminating ethically irrelevant factors will ensure a fair ventilator allocation; however, they do not take into account the “conditions in which people are born, grow, live, work and age” and inequities in socioeconomic status, education, healthcare access that give rise to these conditions. It is likely that the impact of social determinants of health on COVID-19 morbidity is undervalued. COVID-19 seems to have devastating effects on those with respiratory comorbidities rooted in historical injustice and current structural inequities. SML is not only insufficient for mitigating structural injustice, but further entrenches the existing health disparities, making the impact of the pandemic harder for the already-disadvantaged groups.

23. Savulescu, J., Vergnano, M., Craxi, L., & Wilkinson, D. (2020). An ethical algorithm for rationing life-sustaining treatment during the COVID-19 pandemic. British Journal of Anaesthesia, 125(3), 253–258.
24. Wasserman, D., Persad, G., & Millum, J. (2020). Setting priorities fairly in response to Covid-19: Identifying overlapping consensus and reasonable disagreement. Journal of Law and the Biosciences, 7(1), Issue 04.
25. Christian et al., op. cit. note 10; Powell, T., Christ, K. C., & Birkhead, G. S. (2008). Allocation of ventilators in a public health disaster. The New England Journal of Medicine, 383(1), 202–209.
26. Frolic, A., Kata, A., & Kraus, P. (2009). Development of a critical care triage protocol for pandemic influenza: Integrating ethics, evidence and effectiveness. Healthcare Quarterly, 12(4), 54–62.
27. Khan, Z., Hulme, J., & Sherwood, N. (2009). An assessment of the validity of SOFA score based triage in H1N1 critically ill patients during an influenza pandemic. Anaesthesia, 64(12), 1283–1288; Zygyn, D. A., Laupland, K. B., Fick, G. H., Sandham, J. D., & Doig, C. J. (2005). Neuroanaesthesia and intensive care limited ability of SOFA and MOD scores to discriminate outcome: A prospective evaluation in 1,436 patients. Canadian Journal of Anaesthesia, 52(3), 302–308.
28. Maves, R. C., Downar, J., Dichter, J. R., Hick, J. L., Devereaux, A., Gelling, J. A., Kissnon, N., Hupert, N., Niven, A. S., King, M. A., Rubinson, L. L., Hanfling, D., Hodge, J. G., Jr., Marshall, M. F., Fischkoff, K., Evans, L. E., Tonelli, M. R., Wach, R. S., Seda, G., ... ACCP Task Force for Mass Critical Care. (2020). Triage of scarce critical care resources in COVID-19: An implementation guide for regional allocation. An expert panel report of the Task Force for Mass Critical Care and the American College of Chest Physicians. Chest, 158(1), 212–225.
29. Manchanda, E. C., Couillard, C., & Sivashanker, K. (2020). Inequity in crisis standards of care. The New England Journal of Medicine, 383(1), e16(3).
30. Marmot, M., Allen, J., Bell, R., Bloomer, E., & Goldblatt, P. (2012). WHO European review of social determinants of health and the health divide. Lancet, 380(9846), 1011–1029.
31. Abrams, E. M., & Szeftel, S. J. (2020). COVID-19 and the impact of social determinants of health. The Lancet Respiratory Medicine, 8(7), 659–661.
32. The unequal distribution of existing health conditions is unjustly shaped by previous social arrangements that have a negative impact on disadvantaged groups. See Pickering, N. (2020, May 13). Lives vs equity – analysing the dilemma in the COVID-19 response. Journal of Medical Ethics Blog. https://blogs.bmj.com/medical-ethics/2020/05/13/lives-vs-equity-analysing-the-dilemma-in-the-covid-19-response/
The third problem is that it does not address the egalitarian concern that the differences in probabilities of survival must be quite substantial in order to "dissuade us from treating everyone equally or from attending to social justice." For the case considered above, suppose that Group A has a 50% chance of survival with ventilation therapy, and Group B has a 48% chance. For every 10 patients treated in Group A, 5 patients will survive, and 4.8 patients will survive from Group B. SML requires us to save Group A. However, it is intuitively tempting to think that this utilitarian decision is not quite right. It may be permissible to use a lottery to decide whom to save. When patients' prognostic scores are clustered in a narrow range, they may not vary significantly enough to justify differential treatment for similarly situated individuals with COVID-19.

3 THE USE OF LOTTERIES IN THE COVID-19 PANDEMIC

Consider a choice between using a scarce ventilator to save one patient (David) who takes 2 weeks to recover and using the same machine to save two other patients (Mel and Tim), each of whom takes only 1 week to recover. Assume, as most researchers have done, that there is no ethically relevant difference among these three patients, and there is no special tie between the clinician or triage team charged with ventilator allocation and any of these three potential recipients. Assume further that all three patients have the same probability of survival, and David can benefit from treatment as much as his counterparts in the larger group.

For this case, there are at least two methods for consideration: saving Mel and Tim or using a lottery. The allocation of the ventilator can be based on a randomized procedure for which it is impossible to predict which candidate will win. Decision-making by lottery often appears in familiar contexts, ranging from access to dialysis machines to military conscription or jury selection. In the last 40 years, there has been a surge of interest in accounting for the appeal of lotteries in decision-making. Many scholars have extensively explored the relation between justice and lotteries. A lottery assigns the ventilator solely by chance without regard to ethically irrelevant factors such as race, gender, religious orientation, political beliefs, and social status. Based upon the sanitizing effect, the randomized procedure helps eliminate potential biases that may otherwise be introduced by selecting patients based on invalid reasons. It can also promote equality and representativeness, and prevent conflict and domination.

It is arguable that SML is preferable to using lotteries for ventilator allocation during a pandemic. For many commentators, SML is not only supported by consequentialists, but also is an overlapping "consensus" among many ethicists who reject consequentialism. SML is a commonly held belief, but it is definitely not the only concern that may be of interest to us. In the realm of public health, many commentators explicitly support using lotteries for alleviating the challenges caused by COVID-19. Silva argues that, given that the pre-COVID-19 society was not equal, ventilator lotteries can prevent patients from being given preferential treatment on the basis of socioeconomic advantages. Harris asserts that the aim of public healthcare systems is to protect the life and health of each individual, and contends that each patient should be given an equal chance of "restoring the status quo ante." If it is important to value all individuals and groups equally, a lottery system should be used to mitigate the negative influence of structural injustice that put the disadvantaged at greater risk of severe illness from COVID-19. It can help remove institutional barriers for those who disproportionately lack access to the political and health-system processes that frame policies concerning medical rationing. SML is preferable to implementing the individualist lottery only when the difference in probability of survival between patients, or the difference in length of stay required for benefiting patients, is relatively very large.

There are two allocation methods consistent with the value of fairness: flipping a coin (a fair lottery) and implementing the individualist lottery. The question is what method should be used for ventilator allocation during a pandemic, if the value of fairness is deemed crucial. I argue that implementing the individualist lottery is preferable to flipping a coin for scarce resource allocation.

For the case under consideration, Taurek famously argues that the agent responsible for allocating the ventilator should flip a coin to decide whom to save. In addition to Taurek's suggestion, there are two other options for consideration:

Option (1): flip a coin.

Option (2): save the larger group.

Option (3): implement an individualist lottery (or a weighted lottery).

36Stone, P. (2011). The luck of the draw: The role of lotteries in decision making. Oxford University Press.
37Carson, P. F. L., Carson, L., & Martin, B. (1999). Random selection in politics. Praeger Publishers.
38Kamm, F. M. (1993). Morality, mortality Vol. I: Death and whom to save from it. Oxford University Press: Scalonius, T. (2000). What we owe to each other. Harvard University Press.
39Silva, D. S. (2020). Ventilators by lottery: The least unjust form of allocation in the coronavirus disease 2019 pandemic. Chest, 158(3), 890–891.
40Harris, J. (2021). Why kill the cabin boy? Cambridge Quarterly of Healthcare Ethics, 30(1), 4–9.
41Jones, C. (2020, April 07). Coronavirus disease discriminates. Our health care doesn’t have to opinion. Newsweek Magazine. https://www.newsweek.com/2020/04/24/coronavirus-disease-discriminates-our-health-care-doesnt-have-opinion-1496405.html
42Bagenstos, S. R. (2020). Who gets the ventilator? Disability discrimination in COVID-19 medical-rationing protocols. Yale Law Journal Forum, 130, 1–25.
43Taurek, J. M. (1977). Should the numbers count? Philosophy & Public Affairs, 6(4), 293–316.
For those who do not agree with Taurek’s claim, option (2) certainly leads to the best possible outcome. In the context of the COVID-19 pandemic, in order to ensure that the most appropriate triage plan is applied, it is important to balance SML and fairness in a way that can reflect the actual epidemiological situation. In a way, option (3) is a middle route between options (1) and (2). It does not commit us to outcome-maximization but is still sensitive to the number of patients saved. This approach is supported by many non-consequentialists such as Kamm, Timmermann, and Saunders.

Timmermann contends that the only procedure that pays due attention to the separateness of individuals is what he calls the individualist lottery. It means that individual patients receive a chance of obtaining the ventilator only on the basis of the strength of their claims and are not allowed to take advantage of numbers by pooling their chances. Specifically, it divides the chance by the total number of patients \(n\) in need of a ventilator, and assigns a \(1/n\) baseline chance to each individual. Each patient is treated as an equal by having their interests counted. If either of the two patients in the larger group wins, the agent should allocate the ventilator to the lottery winner and save another’s life whenever possible. That means David will have a 1/3 chance of being saved if the individualist lottery is applied, while Mel and Tim will jointly have a 2/3 chance. Thus, it is “practically, but not philosophically, equivalent” to a weighted lottery.

Options (1) and (3) are both consistent with the value of fairness. However, option (3) is better than option (1), since it is responsive to fairness, while still sensitive to the number of lives saved. In the next section, I will turn to the issue of how to implement the individualist lottery for ventilator allocation during a pandemic and of why it is better than flipping a coin.

The number of lives saved during a pandemic depends mainly on two factors: probability of survival and estimated duration of treatment. SML is thus to maximize the ratio of probability of survival to estimated duration of treatment. Rather than focusing on outcome maximization, a better solution for ventilator allocation would be a variant of the individualist lottery. Such an approach would require a moderate triage that considers only whether patients can meet general eligibility requirements, and then implement the individualist lottery to give each patient a chance of receiving treatment that takes account of probability of benefit or the estimated amount of resources required for benefit.

In the stage of moderate triage, it generally attempts to exclude those patients who fit into one of three categories: (a) so healthy that they will likely recover without treatment, (b) so sick that they are unlikely to benefit from treatment, or (c) neither so healthy, nor so sick, but they require an unreasonable length of stay. The exclusion criteria should be set carefully, taking into consideration factors that are detrimental to social justice and egalitarian opportunity. All remaining patients who meet the general eligibility requirements will be put into the individualist lottery to determine priority for treatment. The simplest individualist lottery consists of patients, lottery tickets, and a random selection device. Each eligible patient, after moderate triage, will receive the same number of tickets. It demonstrates the moral conviction that each individual who can benefit from treatment should be given equal concern and respect.

However, fairness is not the only moral value that should be considered seriously. The importance of fairness has to be weighed against other considerations such as the satisfaction requirement, which aims to maximize the satisfaction of claims. Thus, there is a need to prioritize the patients who have a higher probability of survival or who require less time on resources. All eligible patients can be divided into three groups according to probability of survival: (a) high, (b) moderate, and (c) low. In addition to this, they can be divided into another three groups according to duration of treatment: (a) short, (b) standard, and (c) long. These classifications are made on the same basis as that in the previous moderate triage. The difference lies in that the previous triage considers only whether a patient can benefit and the possible quantity of resources required for benefit, whereas the current classifications require individualized assessment of each patient’s medical situation.

The assessment does not necessarily have to be conducted using a rigid scoring system like SOFA. It may rely on clinicians’ individual and collective judgments of each patient’s objective physiological data and self-reported experience data. Nevertheless, one may reasonably suspect that this sorting into groups is controversial and may give rise to doubts about its objectivity and impartiality: "My

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54Newdick, C., Sheehan, M., & Dunn, M. (2020). Tragic choices in intensive care during the COVID-19 pandemic: On fairness, consistency and community. Journal of Medical Ethics, 46(10), 646–651.

55Timmermann, J. (2004). The individualist lottery: How people count, but not their numbers. Analysis, 64(2), 106–112; Saunders, B. (2009). A defence of weighted lotteries in life saving cases. Ethical Theory and Moral Practice, 12(3), 279–290; Hirose, I. (2004). Aggregation and numbers. Utilitas, 16(1), 62–79; Lawlor, R. (2006). Taurek, numbers and probabilities. Ethical Theory and Moral Practice, 9(2), 149–166; Thomas, A. (2012). Giving each person her due: Taurek cases and non-comparative justice. Ethical Theory and Moral Practice, 15(5), 661–786.

56The supporters of SML believe that coin-tossing is implausible because it is insensitive to the variation of numbers, though they do not deny that it is right to flip a coin between equally good alternatives. However, it seems that SML is subject to the same criticism as was coin-tossing. It is insensitive to the variation of the number of individuals in the smaller group. SML would support saving the many when the choice is between saving 1 patient or 10, but it would give the same answer when choice in question is between saving 9 patients or 10, as if the presence of the additional individuals in the smaller group makes no difference to decision-making. Each individual in the smaller group is no less deserving of lifesaving resources than their counterparts in the larger group. They can reasonably complain that if they are denied any chance of being saved on the basis of interpersonal aggregation, the agent failed to give due respect for the independent existence of individuals. Thus, Timmermann argues that the only procedure that respects the separateness of individuals is the individualist lottery.

57For the sake of argument, I assume that in this case, all patients have an equal claim to the ventilator. However, this assumption is problematic if the strength of claims depends both on probability of survival and/or duration of treatment. Those who have a higher probability of survival or who require less time on resources should have a stronger claim to ventilators. I will return to this issue in Section 4.

58Timmermann, op. cit. note 47.
‘moderate’ may be your ‘low’ and your ‘short’ may be my ‘standard’.54 A preliminary response is that these classifications should be as transparent as possible and open for debate. Any disagreement in classifications will be reevaluated, and a consensus should be settled by joint discussion in a timely way to show respect and responsiveness to patients’ needs. For illustrative purposes, the model depicted here is not intended as a powerful decision-making tool, but rather as a tool to suggest an alternative method for COVID-19 resource allocation.

Those with a high probability of survival or a short duration of treatment should be awarded additional tickets, while those with a low probability of survival or a long duration of treatment obtain no additional ticket. The differential distribution of tickets should reflect the relative weight of different kinds of factors and criteria. It is worth noting that the consideration of probability of survival may be preferable to that of duration of treatment. For instance, those with a moderate probability of survival and a long duration of treatment should have more additional tickets than those with a standard duration of treatment and a low probability of survival.

Suppose we have to make a choice between saving John who has an 80% probability of survival and saving Tom who has a 60% probability of survival. In the initial stage, each eligible patient, after moderate triage, is given two tickets, reflecting the idea of fairness that each eligible one should have an equal chance of being saved. If the length of stay for each patient is presumed to be standard, they will each continue to receive two more tickets. So far, John and Tom have the same number of tickets. However, John has a high probability of survival, while Tom has a moderate probability of survival. The difference in probability of survival between the two patients justifies the differential distribution of tickets: John receives four more tickets, while Tom receives only two more tickets. As it turns out, John receives a total of eight tickets while Tome receives a total of six tickets. Although randomness is introduced, those who are most likely to benefit still receive a greater chance of being saved. The individualist lottery is not the best tool to maximize outcomes, but it is fairer than SML and is more sensitive to numbers than coin tossing.

I do not attempt to design the individualist lottery in a comprehensive way that can facilitate healthcare systems to combat COVID-19 without the involvement of judgment and virtue. In fact, some aspects of the individualist lottery are left to the “practical wisdom” of medical professionals. Although it may be agreed that those who are too sick to benefit from treatment should be excluded from the lottery pool, it is open to debate as to what exactly this term “too sick to benefit” means.55 The exclusion criteria should not be set too low so that patients with very poor predicted outcomes requiring an unreasonable length of stay may be treated at the expense of patients with much better predicted outcomes. Likewise, it is implausible to set the exclusion criteria too high, since many patients with moderate disease will be denied access to scarce resources without a hope. Thus, the exclusion criteria should be responsive to factors that are detrimental to pandemic control and egalitarian opportunity.

Furthermore, there is a concern regarding the priority of different factors and criteria. It may be right to give the patients with a high probability of survival some additional lottery tickets to reflect the concern that they should have a higher chance of receiving treatment than those with a moderate probability of survival. However, it is unclear how much additional weight (i.e., additional lottery tickets) should be given to a certain priority group, and what distribution of lottery tickets can reflect the relative weight of different factors and criteria. This presents a challenge to the priority assignment that is far more complex than the simple model I depict here. The individualist lottery should be improved and calibrated in a way that can sufficiently capture the reality of health equity and the decision-making environment characterized by COVID-19. I leave these important questions to the judgment of medical professionals.

5 | Why Should We Use the Individualist Lottery in COVID-19?

The goal of ventilator allocation is not only to promote the health of populations, but to do so in a way that can improve fairness.56 Although efficiency is a crucial element in the public health strategy for combating COVID-19, it does not mean individuals’ claims should be dismissed solely for the sake of SML.57 In this section, I will consider the advantages of the individualist lottery alongside saving lives, justice, pandemic control, and maintaining public trust.

5.1 Saving lives

In a pandemic like COVID-19 where no curative therapy is available, healthcare providers are struggling to save the lives of as many patients as possible. Clinicians are exposed to a greater risk of infection and work-related stress to fulfill their professional responsibility. Many societies are willing to adopt emergency policies such as closing schools or postponing elective surgery to limit the need for critical care resources. All these efforts aim to save more lives. However, the obligation to save as many lives as possible is not the only ethical consideration that should receive attention. We also recognize that public health should honor the fundamental obligation of clinicians to take care of each patient.58 Whenever patients in ICU beds need medical assistance, their claims should not be simply dismissed on the basis of interpersonal aggregation of the number of

54 Silva, D. S., Smith, M. J., & Upshur, R. E. (2013). Disadvantaging the disadvantaged: When public health policies and practices negatively affect marginalized populations. Canadian Journal of Public Health, 104(5), e410–e412.
55 Hershovitz, S. (2020, May 07). You can save one person or five. But not all six. The New York Times. https://www.nytimes.com/2020/05/07/opinion/coronavirus-rationing-dialysis-ventilator.html
56 New York State Task Force on Life and the Law, op. cit. note 19.
lives saved. Although the individualist lottery cannot satisfy all patients’ claims, it at least gives each eligible patient a chance of selection. Those who do not receive treatment might have feelings of anger about their bad luck, but they cannot reasonably complain that their claims are dismissed without due consideration.

5.2 Justice

The fairness of ventilator allocation can be seen from the viewpoint of procedural fairness and substantive fairness. The basic tenet of procedural fairness is that all parties affected by a decision can reasonably reach an agreement on what conditions should be met to make the decision-making process fair, even though there may be disagreement about what is just or unjust regarding scarce resource allocation. Many guidelines and hospital policies have established procedures for triage decisions and the possibility of appeal. They generally state that ventilator allocation should comply with procedural fairness, which requires decision-making that is consistent, impartial, transparent, accountable, nondiscriminatory, and publicly accessible. 59

It is sometimes assumed that health policy should not restrict the range of opportunities open to individual patients. Nevertheless, the fair equality of opportunity principle may be too general and indeterminate to provide useful suggestions for scarce resource allocation. 60 Reasonable people who are interested in achieving a mutual justification of allocation policy will still disagree about how to make trade-offs between conflicting values, even though they may have a consensus on the goal of public health. Alternatively, they may look for a fair process that “makes limit-setting decisions in healthcare not only legitimate, but also fair.” 61 The process requires a deliberate search for mutually justifiable reasons that can justify a resource allocation as an acceptable way to meet health needs fairly. It means that tough decisions should appeal only to reasons that can be reasonably accepted, or at least cannot be reasonably rejected, by fair-minded individuals.

What kinds of reasons can be reasonably rejected? Gender, race, mere disadvantage, and religious reasons can be excluded from the deliberative process. Ventilator allocation based on these factors will not only create unfairness for certain groups but also exacerbate the existing health disparities. Can the allocation based on probability of survival or length of stay be reasonably rejected? The simple answer is no. Although the criterion of fairness (or fair outcome) is indeterminate or cannot be justified independently of procedure, it is possible to provide a reasonable explanation for why an evidence-based policy can promote public health. In addition to mutual justification based on relevant reasons, the process may also include a publicity condition, appeals and revisions condition, and regulative condition, with an eye on public involvement, mechanisms for dispute, and enforcement, respectively. 62 Some options are therefore excluded from consideration, such as allocation based on disability and socioeconomic disadvantage. Nevertheless, there are still several options, such as SML, coin-tossing and the individualist lottery, that are all perfectly consistent with the conditions suggested by procedural justice. How should we choose among these competing options?

A plausible way of doing this is to improve the process by specifying more fine-grained conditions of “constrained pure procedural justice.” 63 It allows choosing fairly between options that are equally consistent with the indeterminate criterion of fairness. Specifically, one solution is that (constrained pure) procedural justice can specify more conditions (e.g., consistency) that have to be fulfilled in decision-making. The problem with it is that these conditions may be too abstract and vague (e.g., different understanding of consistency; lacking substantive constraints) to serve as a basis for settling a disagreement. Another solution is that a voting procedure can be used in order to reach consensus on a final method for resource allocation. However, there seems to be a risk of begging the question on this issue. For those who support Taurek’s view that numbers should not count, coin-tossing is reasonably considered a fair process of improving public health and social justice. If the voting procedure is based on majority rule, it seems, ironically, that we can use “numbers” to deny the thesis that numbers should not count.

It is not my argument that all parties involved in a fair process, constrained or unconstrained, will always select the individualist lottery. Rather, it is just one of many options. The reasons available for mutual justification and other procedural conditions may be consistent with more than one path for resource allocation. Indeed, it is possible to find a way to make a decisive judgment. But the method adopted for this task should not be arbitrary. It requires that the use of the method itself cannot be reasonably rejected by any single party.

Any triage decision should also take substantive fairness seriously. I will provide a few reasons for the use of the individualist lottery in the pandemic. The first point is related to social determinants of health. SML may be considered a successful strategy if existing health conditions (which disproportionately exacerbate the pandemic’s negative impact on certain groups) are equally distributed in a pre-COVID-19 society. 64 However, it is not the case that we were living in a world where each individual has an equal chance of having underlying health conditions, and thus has an equal risk of infection. The disadvantaged groups, defined by socioeconomic status, ethnicity, gender, and immigration status, are mostly likely to have an increased risk of having comorbidities and are least likely to

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59Chase, op. cit. note 9; Norheim, O. F., Ali-Rached, J. M., Bright, L. K., Barea, K., Ferraz, O. L., Gloppen, S., & Voorhoeve, A. (2021). Difficult trade-offs in response to COVID-19: The case for open and inclusive decision making. Nature Medicine, 27(11), 10–13; White, D. B., & Lo, B. (2021). Mitigating inequities and saving lives with ICU triage during the COVID-19 pandemic. American Journal of Respiratory and Critical Care Medicine, 203(3), 287–295.

60Daniels, N. (2008). Just health: Meeting health needs fairly. Cambridge University Press.

61Rid, A. (2009). Justice and procedure: How does “accountability for reasonableness” result in fair limit-setting decisions? Journal of Medical Ethics, 35(1), 12–16.

62Daniels, op. cit. note 60.

63Rid, op. cit. note 61.

64Silva et al., op. cit. note 56.
be in a position to influence the policy-making process. As a result, these groups are relatively less likely to benefit from equal health provision, and are more burdened by universal public health measures. SML will almost certainly ensure an unfair burden with devastating effects on disadvantaged groups.

Health inequities systematically put already-disadvantaged groups at further disadvantage with a negative impact on their health. As an alternative to SML, the individualist lottery may promote health equity, or at least does not exacerbate existing health disparities. It requires the difference in probability of survival and/or length of stay must be sufficient to dissuade us from the commitment to human equality. Some may argue that disparity-reduction in other contexts, such as education and employment, does not typically prioritize disadvantaged groups who are less likely to benefit, even though the disparities similarly stem from structural injustice. But this view can be refuted. We have different senses of fairness for different social sectors. There is a distinction between patients who need ventilators for life-saving and candidates who apply for admission to education programs or find a job in the labor market. In critical care situations, medical resources are allocated based on patients' needs, while deservingness, as a criterion widely adopted in the arena of education and employment, is not a relevant consideration in life and death decisions.

The second advantage of the individualist lottery is that it coheres with generally held beliefs about utility. As discussed in Section 3, flipping a coin between two groups with different probability of survival is insensitive to the number of lives saved, while SML lies at the other extreme, that is, numbers should be taken into account at all in decision-making. Either method is tantamount to viewing only one side of a coin. In order to obtain a more integrated view of ventilator allocation, the individualist lottery combines the merits of both methods. The individualist lottery introduces randomness, but it practically does not assign the same chance to individual patients. Those who are most likely to benefit from treatment will certainly receive a higher chance of being saved.

5.3 | Pandemic control

Prioritizing the worst-off is another egalitarian approach to ventilator allocation. Ventilators should be preferentially allocated to the sickest patients or alternatively to the disadvantaged groups. The advantage of this approach is that it can improve health equity by focusing on the benefits of certain disadvantaged groups. However, giving higher priority to the worst-off is hardly coherent with SML. Ventilators will inevitably be assigned to those significantly less likely to benefit, resulting in more preventable deaths and a reduced survival. A fair allocation does not mean providing ventilators to the worst-off or disadvantaged groups irrespective of whether they can save lives. It requires giving priority to those who are severely affected and need ventilation but are still well enough to benefit from treatment. Neglecting the health of the population will exacerbate the spread of coronavirus, which would have a devastating impact on pandemic control. Likewise, the method of “first-come, first-served” should be rejected on the same basis as given above.

Furthermore, prioritarian protocols can be criticized for basing ventilator allocation on social criteria, not on medical needs. Healthcare providers need to decide which individuals count as members of disadvantaged groups, and such a task seems epistemologically impractical during a pandemic. This raises the issue of feasibility on how to identify disadvantaged group members. As Reid argues, data on disadvantaged groups are usually not complete, and they are collected only for the purpose of “monitoring health system performance and enabling epidemiological surveillance.” Prioritarian protocols would make health systems less effective and more costly in pandemic control. In order to sort patients properly, it may require much more medically relevant or irrelevant information from patients for priority assessment than the individualist lottery does. There is a risk that the effort and time spent on checking and processing the massive amount of information will overwhelm medical services. Thus, the prioritarian approach is not a readily implementable solution for pandemic control.

5.4 | Maintaining public trust

There is a debate whether it is appropriate to give healthcare workers (HCWs) priority for ventilators. This problem is not only a matter of saving lives, but also related to the normative role of HCWs and its impliciation for public trust. The reasons for prioritizing HCWs for ventilation can be bifurcated into two parts: (a) the instrumental reason of their narrow social utility in responding to the pandemic, and (b) the non-instrumental reason of reciprocity for someone risking their lives to help others. However, both lines of reasoning are controversial and raise a host of ethical concerns. The primary problem with the instrumental reason is that there is a lack of a clear definition of HCWs who are most deserving of ventilators. The category of HCWs is usually specified in a way that heavily rests on

65Pickering, op. cit. note 32.
66Braveman, P., & Gruskin, S. (2003). Defining equity in health. *Journal of Epidemiology & Community Health, 57*(4), 254–258.
67Persad, G. (2021, June 14). Allocating medicine fairly in an unfair pandemic *(Legal Research Paper Series Working Paper No. 20-26)*. University of Illinois Law Review. https://ssrn.com/abstract=3499769
68Rhodes, R. (2020). Justice and guidance for the COVID-19 pandemic. *The American Journal of Bioethics, 20*(7), 163–166.
69Pathak, P. A., Sönmez, T., Urver, M. U., & Yenmez, M. B. (2020). Leaving no ethical value behind: Triage protocol design for pandemic rationing *(NER Working Paper No. 26951)*. National Bureau of Economic Research.
70Reid, op. cit. note 12.
71Jacobs, N. S., Wightman, A. G., & Diekema, D. S. (2020). Prioritizing frontline workers during the COVID-19 pandemic. *The American Journal of Bioethics, 20*(7), 128–132.
72Aulisio, M. P., & May, T. (2020). Why healthcare workers ought to be prioritized in ASMR during the SARS-CoV-2 pandemic. *The American Journal of Bioethics, 20*(7), 125–128.
73Cheung, A. T., & Parent, B. (2021). Mistrust and inconsistency during COVID-19: Considerations for resource allocation guidelines that prioritise healthcare workers. *Journal of Medical Ethics, 47*(2), 73–77.
subjective judgments of social utility. Furthermore, it is questionable whether HCWs with COVID-19 will recover to return to the front lines as soon as possible.

The non-instrumental reason for prioritizing HCWs is based on the duty of reciprocity. Reciprocity means that those who accept greater risk for the good of society deserve preferential access to life-saving resources or a special consideration in the case of a tie. In the absence of personal protective equipment (PPE), HCWs risk their lives to help others in the face of unprecedented risks. This makes it the case that they are owed adequate PPE and other essential health supplies. But, it does not necessarily follow that they should be prioritized for critical care resources like ventilators and ICU beds. Moreover, prioritizing HCWs seems inconsistent with the fundamental duty of clinicians to care for their patients. Although the relative strength of the duty to care may be weakened due to the shortage of PPE and the presence of unique circumstances, clinicians are not permitted to neglect their duty to care without any justification. Clinicians’ jobs entail risking themselves to benefit others. Nevertheless, the fact that they are risking their own safety for the good of the public itself is not sufficient to abolish other potentially conflicting concerns. In a pandemic like COVID-19, ethically complex decisions have to be made that balance prioritizing HCWs against the duty to care.

The individualist lottery can capture the underlying structure of both views. On the one hand, prioritizing HCWs may create public mistrust among patients from whom ventilators are moved away to benefit HCWs “entrusted to treat those patients.” If the policy of prioritizing HCWs is adopted, patients can reasonably complain that their claims are not allowed to make a difference to decision-making. It is as if the role of HCWs were the only factor that determines ventilator allocation. On the other hand, it is reasonable to consider that the painstaking efforts of HCWs, effectively mitigating the negative impact of COVID-19, should be repaid. So why not use the individualist lottery to maintain public trust while still acknowledging the importance of the role of HCWs in combating COVID-19? Suppose we have to make a choice between saving a patient and saving a HCW with the same medical outcome. The individualist lottery will give the HCW some more lottery tickets to increase her chance of receiving treatment. Meanwhile, the patient’s claim is not simply denied and is still given a chance of satisfaction. The chance each individual will actually receive treatment varies, depending on the judgment of the relative importance of HCWs’ prioritization and maintaining public trust.

6 | CONCLUSION

I have argued that maximizing medical outcomes by allocating ventilators to save the greatest number of patients is not a plausible strategy for combating COVID-19. There are reasons of fairness to implement the individualist lottery that would give each eligible patient a chance of receiving ventilators. Although the aim of the individualist lottery is to fairly allocate scarce resources, it does not imply that it is insensitive to the number of lives saved. The individualist lottery still gives considerable weight to the concern of SML.

Ethical values and principles are important for developing public health policy, particularly with the spread of coronavirus, but the selection of patients regarding who receives treatment does not naturally follow from them. There is a need to weigh various factors—saving lives, justice, pandemic control, and public trust—to achieve an effective, fair, and socially responsible policy. How should these factors be balanced with each other? It depends on the context in which we are struggling to appreciate the complexity and variability of the pandemic. Triage decisions should be made in a way that can reflect the importance of discernment and judgment of medical professionals. Relying only on a random selection system risks “delivering the right answer for the wrong reason.”

What we need for a triage policy is not only a matter of an algorithm for evaluation and management of patients with COVID-19, but also of a deeper understanding of public health ethics that is sensitive to the weighting of different moral values and principles.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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Sveen, W., & Antommaria, A. H. M. (2020). Why healthcare workers should not be prioritized in ventilator triage. The American Journal of Bioethics, 20(7), 133–135.

McGuire et al., op. cit. note 25.

Bakewell, F., Pauls, M. A., & Migneault, D. (2020). Ethical considerations of the duty to care and physician safety in the COVID-19 pandemic. Canadian Journal of Emergency Medicine, 22(4), 407–410.

Cheung & Parent, op. cit. note 73.

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