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Letter to the Editor

Allocation of scarce public health resources: ethical principles, COVID-19 vaccines, and the need for socially optimal dosing



Decision-making regarding scarce public health resource allocation is intrinsically ethical,¹ and so is directly relevant to the expected professional standards.² An ethical framework of four simple categories, each composed of two morally relevant principles, is generally considered to inform such decision-making.³ The first is equality, which requires that all citizens be treated equally. This may be achieved through first-come, first-served access to resources (1a), or a lottery process, in which all individuals have an equal chance of selection (1b). The second is favoring the worst-off, which requires the prioritization of certain groups. This may be achieved by prioritizing those at the highest risk of poor outcomes (2a) or those who have lived the least life to date (2b). The third is utilitarianism, which requires maximizing aggregate benefits across a population. This may be achieved by maximizing the number of individual lives saved (3a), or by maximizing the number of life-years produced by considering prognoses across various groups (3b). The fourth is promoting and rewarding social usefulness. This may be achieved by a future-oriented recognition of instrumental value (4a) or past-oriented reciprocity of implemented behaviors (4b). While some are morally flawed (such as 1a), each of these principles is individually insufficient, meaning they must be combined into multiprinciple combinations to inform scarce resource allocation decision-making.

A pertinent example of such ethical decision-making is the ongoing allocation of COVID-19 vaccines. While presently less scarce in high-income societies, demand for these pharmaceuticals far exceeded supply in the initial stages of roll-out strategies and continues to do so in resource-poor settings. Examining a country's vaccination strategy reveals the ethical principles underlying its decision-making. For example, the United Kingdom⁴ prioritized its highest risk groups (2a), including older, pregnant, and immunocompromised people. It also recognized the instrumental value of front-line healthcare workers (4a) by vaccinating professionals in patient-facing roles. Finally, it maximized aggregate benefits across its population by extending the interval between first and second doses, which served to increase the number of individual lives saved (3a) by administering first doses to more people sooner.

Using this ethical framework to examine the United Kingdom's vaccination strategy allows exploration of whether its moral acceptability may have been improved by the adoption of alternative multiprinciple combinations. For example, the use of a lottery (1b) would have reified equality and reduced discrimination against those not prioritized. By favoring younger people (2b),

those who have lived the least amount of life would have been afforded the opportunity to live as long as existing elderly people. Finally, socially optimal vaccine dosing would have maximized aggregate benefits by increasing the total number of individual lives saved (3a).

While socially optimal vaccine dosing promises to maximize aggregate benefits across society, it is to date an unutilized strategy on the international stage.⁵ Such strategies permit the administration of a less individually efficacious dose of a scarce resource to a larger number of people to increase its marginal efficacy within a specific population. For example, consider a 5000 µg supply of a scarce vaccine of which 50 µg and 25 µg doses are 95% and 75% effective at preventing death in the same at-risk population, respectively. In a population of 2000 people who would otherwise die, administering the 50 µg dose to 1000 people prevents 50 deaths but leaves 1000 individuals unprotected, thereby resulting in 1050 deaths, while administering the 25 µg dose to 2000 people prevents 1500 deaths, thereby resulting in 500 deaths. As such, 550 more deaths are prevented by administering the less individually efficacious dose to the entire population than administering the more individually efficacious dose to half of it. The marginal utility of the vaccine—the number of deaths averted per µg administered—has been increased, rendering this strategy more distributively just than its alternative.⁶ While insufficient on an individual basis, this strategy is void of ethical flaws, rendering it a viable candidate for inclusion in multiprinciple combinations to underlie decision-making regarding scarce resource allocation.

Scarcity renders public health resource allocation an inherently ethical decision space. Using the above framework to examine a country's COVID-19 vaccination strategy provides opportunities to identify ethical principles that could be recruited to improve the moral acceptability of future decision-making regarding scarce public health resource allocation. For achieving this, socially optimal vaccine dosing should be made routinely available for all new vaccines. This necessitates exploration of a vaccine's dose-response relationship through randomized dose-finding clinical trials to reveal the socially optimal dose under conditions of scarcity. Such knowledge could deliver distributive justice by maximizing social benefits and mitigating inequalities.

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