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Moral Principles for Allocating Scarce Medical Resources in an Influenza Pandemic

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Abstract One of the societal problems in a new influenza pandemic will be how to use the scarce medical resources that are available for prevention and treatment, and what medical, epidemiological and ethical justifications can be given for the choices that have to be made. Many things may become scarce: personal protective equipment, antiviral drugs, hospital beds, mechanical ventilation, vaccination, etc. In this paper I discuss two general ethical principles for priority setting (utility and equity) and explain how these principles will often point in diverging directions. Moreover, each of these principles can be understood in different, again often competing, ways. Notwithstanding these controversies and conflicts, in the context of pandemic response there are at least some points of convergence: several policies can be justified by appeal to different ethical principles and theories. Convergence may be found with respect to a focus on saving the most lives (instead of other aggregative accounts); giving priority antiviral prophylaxis and therapy for life-saving pandemic responders; and, partly depending on epidemiology of the pandemic, to prioritise vaccination of children. Although decision-making about access to intensive care will involve choices with immediate tragic implications, the ethical complexity of these choices is relatively modest (although decisions will not be easy): there are persuasive moral reasons for giving priority to patients who are expected to benefit most within the shortest time. Finally, in the last section I tentatively argue that constraints on people's freedom, as necessary for an effective public health approach, may support giving somewhat more weight to saving the most lives, than to concerns of equity.

Keywords Ethics · Justice · Influenza · Pandemic · Priority-setting · Rationing · Triage · Efficiency · Equity · Fairness · Equitable access · Vaccination · Antiviral drugs · Neuraminidase inhibitors · Intensive care · Mechanical ventilation · Harm principle

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Ethics and Pandemic Influenza

It is generally expected that sooner or later a novel influenza A virus sub-type easily transmissible from

person-to-person will emerge and cause pandemic disease. Humans will then have little or no immunity against this virus, which could spread as easily as common seasonal influenza, infect many people worldwide and may potentially result in very high mortality and morbidity rates. In the 20th century three such pandemics occurred, with the 1918–1920 "Spanish Flu" as the most devastating epidemic. It is estimated that the Spanish Flu caused 50 million deaths worldwide, but experts emphasise that these figures are uncertain, and that the death toll could even be up to 100 million (Johnson and Mueller 2002). Nowadays the world population is much larger and a comparable toll in our times could be between 175 and 350 million (Barry 2005). There are also many reasons for thinking that a new pandemic would be less disastrous. Compared to 1918, people in most parts of the world today live in conditions that are much better in terms of hygiene. Moreover, at least in high-income countries, far fewer people have shortages of necessary nutrition. Today's state of medical knowledge and the possibilities for treating patients with all kinds of illnesses and symptoms are far more advanced in comparison with the limited medical possibilities 90 years ago. Antiviral drugs (neuraminidase inhibitors like oseltamivir) may possibly help to avoid some of the worst complications of influenza; antibiotics will play a role in the treatment of secondary bacterial infections; and mechanical ventilation can help patients who develop respiratory failure as a result of influenza. On the other hand, modern mobility seems to create ideal conditions for a new virus to spread over the world within a matter of days or weeks. Vaccination offers reasonable protection against seasonal influenza, but in a pandemic mass production of an effective vaccine will not start for several months. Moreover, the basic as well as sophisticated medical resources we have now may become extremely scarce if the population is overwhelmed by a pandemic. Certainly, such resources are not commonly available in many low-income countries. And last but not least, it is unknown what sort of antigenic shift in the virus will cause the next pandemic and, hence, there is uncertainty to what extent, for example, antiviral drugs will be effective in reducing morbidity and mortality during a pandemic. All expectations and predictions about the magnitude and impact of a new influenza pandemic are filled with uncertainty. Some scenarios assume attack rates of up to 35 percent and lethal disease in 1–2 percent of all persons who develop symptoms, yet such assumptions may be a gross overestimation or underestimation of the crisis (LCI 2006). Even in less extreme scenarios, drastic public health interventions will be necessary to contain or mitigate the pandemic. Policies that aim at "social distancing" will be important, such as the closure of schools and workplaces, and the quarantine of persons who may be exposed to the virus. Moreover, examination, isolation and treatment of patients will be necessary. Obviously, vaccination will play a major role as soon as an effective and safe vaccine is available. People may need to be compelled to comply with such interventions, and this clearly raises ethical and legal concerns (Kotalik 2005; Gostin and Berkman 2007).

In this paper I will not focus on such measures, but on the moral problems that arise due to scarcity of medical resources. Even if a pandemic were not as severe as the darkest scenarios suggest, one can reasonably expect that, both on local and global scales, the demand for medical care and protection will exceed (affordable) supplies. Countries are now creating stockpiles of neuraminidase inhibitors like oseltamivir (*Tamiflu)*, which may be used both as prophylactic as a therapeutic means against influenza. The Netherlands has a stockpile which should be sufficient for treating 5 million citizens (30 percent of the population) who it is projected would develop influenza symptoms. However, even with such a stockpile, there may be insufficient drugs available for large-scale (post-exposure) prophylaxis. The more drugs are used for prevention of infection in persons who *might* get infected, the less will be available for treating persons who are having symptoms of influenza.

Many patients who get ill may develop respiratory failure and require mechanical ventilation. The need for such intensive care will go far beyond available resources.

Moreover, the disease will hit health care professionals and related personnel as well: working in the frontline they may even run greater risks of infection than other citizens. This only reinforces pressure on the health care system, where much more must be done with fewer staff. Triage decisions for allocating scarce possibilities for treatment will be inevitable. These decisions need to be made about supportive medical care (e.g. ventilators), antibiotics, antiviral drugs, and vaccines, as well as access to healthcare facilities in general. Two very general ethical princi-

ples for such decisions are utility and equity. In this paper I explore different interpretations of these two principles, and discuss how these can conflict but also converge in general policies as well as in choices concerning allocation of specific resources.

Resource Allocation in a Pandemic

Throughout the last decades it has been very difficult to establish consensus-based or well-justified principles for priority setting in health care (Daniels 2008, 105-117). In times of an influenza pandemic the same controversies arise, but in extraordinary circumstances. The demand and need for health care will be much higher than is normally the case and simultaneously the health care system will be weakened as a result of ill or absent staff. If only relatively few persons can be treated, and most others are left without the care they need, this may raise distrust in professionals, institutions and governments. Moreover, fear of the disease may paralyse societal life or lead to panic and further distrust in governments and institutions. In such circumstances, the objective of developing principles for priority setting seems even more controversial than in "normal" health care settings. Finally, important factual issues that are more or less known in normal circumstances (the effectiveness of the various medical options; which groups are most at risk; which patients most urgently need treatment; and how many there are) are not known in advance.

However, these extraordinary features do not necessarily render any attempt to priority setting impossible, and to some extent they might even facilitate the development of some principles for priority setting. First, a pandemic is to be considered as a world-wide emergency situation where all or almost all individuals are susceptible and therefore threatened. Policies should focus, then, on protection of all members of the population at large. This is an objective that few will reject. Second, the uncertainties about *who* will be most at risk for severe illness and death in a pandemic might necessitate that decision-makers focus on general principles and arguments, instead of on specific groups or persons who should be given priority. If all are uncertain about who would benefit from certain proposals and who would not, this might help generate some agreement on principles—the unknown dimensions and characteristics of a future influenza pandemic create, as it were, an inevitable "veil ignorance" similar to the "original position" in Rawls's theory of justice (Rawls 1971).

Two further complexities need to be mentioned at this stage. Priorities need to be set for medical resources that differ in many relevant respects, with vaccination, patient care, and antiviral drugs being the most notable. Vaccination is meant purely for preventive purposes and is aimed at those who have not yet been infected; (hospital) medical care involves therapy aimed at the (very) ill; and antiviral treatment can be used as an early treatment for patients, and as post-exposure or pre-exposure prophylaxis. There are also differences in the dynamics of scarcity. Production of vaccines will not start within several months after the onset of the pandemic, and vaccines may then become available in increasing quantities. The availability of antiviral drugs and access to hospital care, on the other hand, will decrease rapidly during the first weeks of the pandemic. These differences in resource availability over time justify having distinct approaches for priority setting.

An additional complexity is that the differences between high-income countries and middle- and low-income countries will be immense. Some high-income countries expect to have sufficient stockpiles of antiviral drugs for treating all persons who develop symptoms of influenza. Low-income countries will probably have little or no stockpiles at all. Something similar applies to vaccination. Many high-income countries are signing contracts with pharmaceutical companies, in order to reserve production capacity and get pandemic vaccine as soon as it becomes available. Low-income countries will not have such contracts, and hence might have nothing to distribute. Some dilemmas that are seen as perplexing in hospitals in the developed world, such as priority setting in critical-care departments, may be completely absent in many regions in Africa, where no intensive care units might be available at all. Low-income countries must balance their efforts in pandemic preparedness with regular health care needs, given that such needs often remain unmet even in "normal circumstances". Any adequate response to a pandemic requires infrastructures for primary care and prevention. Hence, for many low-income countries the first priority for pandemic

preparedness may involve strengthening their basic health care facilities and infrastructure.

In the following sections I will discus two general principles for priority setting: utility and equity. In major disasters where many lives are at stake, there are strong moral reasons to protect the population and save as many as possible with available resources. On the other hand, distribution of scarce medical resources should also be equitable and fair. Arguably, these general principles are relevant in any situation of allocation of scarce medical resources. In the context of a pandemic, however, these principles may be given different weight and interpretation.

Efficiency and Utility: Saving Most Lives With Available Resources?

A common assumption in health care is that patients who are most ill and urgently require treatment, should be treated first. In an influenza pandemic a different approach might be justified and necessary. Pandemic influenza will spread rapidly, potentially affecting or killing many people, and it will put the health care system under very heavy pressure. All persons run the risk of being infected, many (if not all) are at some risk of fatal illness, and clearly not all can be saved. Moreover, during an epidemic, one should not only focus on the beneficial effects of prophylaxis or therapy for the persons who are treated. Vaccination of a person will not only protect this person, but also prevent this person becoming contagious and infecting others. The same applies to other forms of protection, including prophylactic uses of antiviral drugs. In these circumstances it makes sense to depart from the common medical ethos of prioritising the most needy and urgent, and to allocate health care resources in such a way that maximum protection of the population at large will be realised. Efficient application of scarce medical resources then becomes a central concern. A principle of mere efficiency however is silent with regard to *which* goods are to be maximised. Likewise, a consequentialist ethical theory, endorsing the idea that one should maximise expected value, must have a clear account of which values are to be promoted.

Epidemiological modeling studies and government action plans for pandemic planning and response often focus on *saving the most lives*. This objective probably fits many people's common sense moral beliefs about how to act in a disaster, yet a focus on saving the most lives is not the only reasonable option. Utilitarians and other consequentialists may argue that a broader account of health benefits is preferable. For example, allocation of medical resources could be done in such a way to maximise life-years, or quality-adjusted life-years (QALYs) or disability-adjusted life years gained.

More broadly, public health interventions could aim at maximizing expected utility, in which goods as diverse as life, health, happiness, economic flourishing, etc are combined. As a result, utilitarianism can sometimes prioritise protecting societal institutions or essential economic functions instead of saving the most lives (Kass et al. 2008).

Such a broad conception of aggregate value has implications that are rejected by many non-consequentialist theories. After all, if it is acceptable in moral argument to aggregate benefits and harms over people, then one must sometimes accept that to save one person in real need is not required if this would lead to a small inconvenience for a great number of persons. In this way, the stronger claim of the individual is given less weight than the much smaller claims of the many, which is considered unacceptable in a theory where persons are of central concern (cf. Scanlon 1998). A non-consequentialist theory like Scanlon's however can accept the principle to save the greater number of lives, starting from the assumption that all persons have a strong and equal claim to have their lives saved. In a pandemic many persons will get ill and may die, and not all can be saved. In those circumstances it is reasonable for all to accept a principle that supports saving the largest number of lives. Such a principle seems to involve aggregation of the claims or lives of individuals. However, if the focus is on saving lives (and not on less weighty values), and if each life counts equally, this will not allow sacrificing someone's life in order to secure smaller benefits for the greater number.[1]

[1] Hirose (2001) shows that in a contractualist framework it is even possible to accept the principle to save the greater number, without relying on aggregation or combining the claims of individuals. Assuming that all persons whose lives are in danger have a equal claim to be saved, the Pareto principle and the requirement of universalisation are sufficient to argue for saving most lives.

There are also consequentialist and pragmatic reasons against policies that maximise general utility. Especially when society finds itself threatened by a lethal infectious disease, potentially raising panic and fear, it is important that the public feel they can trust health care institutions and government policies. Policies that aim to protect societal and economic functions may support giving governments and others in positions of leadership priority access to prevention and treatment. If governments and persons in power receive a level of protection that is inaccessible to large parts of the public, this will easily raise suspicion and distrust amongst the public. In contrast, a principle to *save as many lives as possible* is very simple and clear, and cannot be easily tailored to secure just the interests of groups who are in power. This further helps to avoid unfairness and to promote public acceptance.

These considerations support the adoption of an approach that distributes health care during the pandemic on the basis of maximizing health benefits, and saving lives in particular. The scope of concerns is restricted to concerns about health and disease, and non-health benefits should not determine rationing policies. Of course, protecting the economy and other sources of welfare are important considerations for pandemic preparedness, but these might especially play a role in determining the (extra) budget available for pandemic response. For example, building a stockpile will require large amounts of extra funds and deliberation about how many resources should be made available will depend on weighing the importance of non-health goods, such as welfare or education (Cf. Brock 2003).

If the focus is on health benefits, and saving lives in particular, a next issue is whether *indirect* benefits should be taken into account as well (Brock 2003). For example, treating a health care worker is not only beneficial because it might save her life, but if she recovers, she will contribute to saving the lives of further persons. Therefore, it makes sense to give health care workers priority access to treatment. In normal health care circumstances, such considerations are often considered inappropriate and unfair. In a pandemic, however, many persons will die from influenza, and the number will rapidly increase if essential health services cannot be sustained. A policy that gives some priority to protecting and treating persons who save lives will reduce overall mortality and hence increase each person's chance of survival. For that reason, the policy can be justified to anyone. This approach also mitigates an ethical dilemma by providing care to healthcare providers who are asked to assume an increased risk of disease because of their occupations and provides a practical incentive for them to come to work.

In conclusion, in response to a pandemic it is essential for governments to protect the population at large. Even though a pandemic will pose a threat to all values in societal life, there are consequentialist and non-consequentialist reasons for focusing on policies that maximise health benefits, and, more narrowly, on saving the most lives. Nevertheless, even though a focus on "saving lives" will be less unfair than a focus on broader health benefits, conflicts with equity are still inevitable.

Equitable Access and Fairness

The second principle, equity, or fairness, involves giving equal weight to equal claims. This general idea already played a role in shaping the principle of saving the most lives. There are, however, further implications of equity (notably egalitarian concerns) that need to be clarified, not only because they may sometimes conflict with utility, but also because there are various conflicting implications between the different concerns of equity. In short, equity supports (1) a rejection of various forms of discrimination, (2) attempts to minimise unfairness, and (3) giving priority to groups who have a relatively strong claim to life-saving treatment, such as persons at high risk of severe disease and death, and persons who are relatively young. Moreover, (4) if certain groups of "pandemic responders", while working for the protection of all, are at increased risk to get infected themselves, it would be fair and reciprocal if they were given priority access to prevention and therapy as well.

Discrimination and Group Favouritism

Some practices are inconsistent with any account of fairness. In the face of a pandemic there is a danger that authorities who have the power to set priorities and allocate resources will favour their own friends and families or ethnic group, or otherwise discrimi-

nate according to religion, gender, etc. For example, authorities might decide to use limited stockpiles of antivirals to prophylactically protect themselves and their groups, and leave others in a situation where no antivirals will be available for treating persons who become ill. Such discrimination is grossly unfair and violates basic human rights. If decisions about whom to save from a lethal disease, and who not, are just based upon personal characteristics of members in the population (kinship, friends, ethnicity, nationality, gender, etc), then such decisions obviously violate the equal worth of persons. Priority setting should be based upon criteria that are relevant and justifiable to all—not just to one's own group. If priorities are set on the basis of personal preferences of those in power, this will normally lead to a situation where groups who are suppressed or otherwise worse off will be neglected. Moreover such policies will probably not protect the health of the public in any efficient way.

Minimizing Unfairness

Issues of fairness do not just arise in cases of explicit discrimination. A policy that aims to save the greater number of lives (or to maximise health benefits more generally) can be unfair as well. For example, focusing vaccination on urban areas might save more lives more efficiently than giving equal attention to rural areas, just because in urban areas there will be more people with more interaction and hence more transmission of the virus, compared with rural areas. Yet this policy could leave the rural areas unprotected. This might be unfair because, even if, with the same resources, more persons can be saved in urban areas, persons in rural areas could argue that their lives should be taken into account as well, and policies that disregard their interests completely would be unfair. If the sole principle were to save the most lives with given resources, such forms of unfairness may be inevitable. However, priorities should be devised in such a way that unfairness is minimised where possible. In the example above, this would support a more proportionate distribution of vaccines over urban and rural areas. This does not necessarily imply that the vaccine must be given to equal portions of both populations. Some modeling studies suggest that directing limited vaccine supplies to children (who are sometimes considered as "superspreaders") would reduce virus transmission in communities. Longini et al. (2004) claim that vaccinating 80% of the children aged less than 19 years is almost as effective as vaccinating 80% of the population. If this were true, such vaccination of all children in urban and rural areas would give both children and adults a reasonable prospect of protection and thus strike a reasonable balance between efficiency and equity.

Priority to Worst-Off: Risks

These considerations however do not exhaust the implications of equity. Equity also supports giving priority to persons who are worst off (Arneson 2002; Cf. Parfit 1997). This idea is one of the basic principles in John Rawls's egalitarian theory of justice (Rawls 1971).

Yet which persons could rightly claim they are "worst off" and should therefore be given priority in pandemic rationing policies? If priorities are set with the aim of saving lives (and not, more broadly, maximizing welfare) then it makes sense to restrict evaluation of people's situations to issues that are relevant for the value that is at stake, that is, their life. Persons who are worst-off from an economic point of view do not just for that reason have a stronger claim to protection of their life compared to others. On the other hand, someone who is very ill has a stronger claim to care than someone who is and might remain healthy. This supports prioritizing therapeutic treatment over prophylaxis in many cases, which is especially relevant in decision-making about antiviral treatment. For the same reasons, one might argue that persons in high-risk groups have a stronger claim to protection—they run a greater risk of dying if they are infected—than other persons. Only during a pandemic will it become clear which groups are at highest risk.

Priority to Worst-Off: The Fair Innings Argument

There is another sense in which certain persons have a stronger claim than others to have their lives protected. This has to do with their age and whether or not someone has been able to live up to a full lifespan. One might argue that death at 80 is not as bad as death at 40, and death at 5 is worse than at 40. This suggests a specific account of fairness, known as the *fair innings argument* (Daniels 1988; Williams 1997). The basic egalitarian principle is that institutions should promote equality of opportunity. Older persons

will have had many more opportunities in their life than persons who die at young age. Therefore, when we can save some but not all, it is fair to save younger persons, who would be worse off if they died at their age, than the elderly (Kamm 1993). While the fair innings argument, as such, supports giving priority to saving the lives of the young above saving the elderly, it does not specify age groups or cut-off points for prioritisation. Decisions about where to draw the line will also be based on availability of resources.

It is clear that egalitarian approaches can point in completely different directions: some will give priority to saving the elderly, assuming they run a higher risk of severe disease and death than others, others will prioritise children, given that they have not had the many opportunities of life which the elderly have had. For that matter, there are also different (non-egalitarian) arguments for prioritizing children and young adults. Depending on the epidemiology of the pandemic, protecting the young might be the best way to maximise health benefits in terms of life years saved (or DALYs or QALYs). Moreover, if society at large is at risk, then from a utilitarian point of view it could make sense to protect those groups that will be most important for the sustaining and rebuilding of societal functions, now and in the future (Emanuel & Wertheimer 2006).[2]

Reciprocity Towards Persons Who Accept Risk for the Common Good of Saving Lives

There are also different (non-egalitarian/non-prioritarian) reasons why some persons may have a relatively strong claim to life-saving treatment. Special consideration should be given to the circumstances of health care workers and others who play an essential role in fighting the pandemic and may do so in a situation in which they themselves run a greater risk of being infected than those in the general population (University of Toronto Joint Centre for Bioethics Pandemic Influenza Working Group 2005). If health care workers who treat influenza patients, but also persons who clean contaminated spaces, run significant risks in their work, they have a very strong claim to be protected against disease or be treated as well as possible when they get ill. Society needs them to accept risks and therefore it would be fair if society offers them protection that might compensate for the increased risk. This argument raises questions about scope: which groups should be given special treatment for reasons of fairness, but also, what level of protection can they reasonably claim? Is the provision of personal protective equipment (PPE) sufficient? Or should they also have priority access to vaccination or even pre-exposure prophylaxis? Certainly, priority treatment if they get ill is justifiable and also provides a practical incentive for individuals to accept increased risk of exposure.

This argument of reciprocity depends on whether, in the case of pandemic influenza, health care workers and other pandemic responders indeed do run a significantly greater risk of infection than other citizens. If there is an increased risk to health care workers, then reciprocity supports giving priority access to protection and treatment in such a way that their risk will be similar to that of other citizens. However, if influenza is spreading very easily within society, there may be little or no increased risk of exposure in hospitals. Moreover, if there is an increased risk of exposure in hospitals, consistent use of PPE may reduce that risk to health care workers to a level that is similar to that of other citizens. In such cases, the argument of reciprocity will not support further priority health care for health care workers.

However, there are also independent (consequentialist) arguments for prioritizing health care workers and other pandemic responders as a group to be protected. Protecting them will contribute to sustaining the health care system, preventing nosocomial spread of the infection, and otherwise save the lives of people. This supports priority access to PPE, post-exposure prophylaxis, and vaccination for health care workers. It may also support access to anti-viral treatment if

[2] Emanuel and Wertheimer (2006) suggest an approach to vaccine allocation that combines (a) the fair-innings argument with (b) (utilitarian) concerns about public order, but they also introduce (c) an "investment refinement". The latter element involves giving priority to people between early adolescence and middle age, because they invested more in their lives compared to, e.g. very young children. However, it is difficult to see why persons who have invested more in their lives have a stronger moral claim to life-saving interventions than others. It may be tragic if persons have been investing in their lives in vain, but why would that support giving them priority access to vaccination? Maybe the "investment refinement" is relevant if it protects especially persons who are necessary to sustain and rebuild society, but then Emanuel and Wertheimer do not need an additional principle next to their (utilitarian) "public order" principle.

they get ill as this would increase the chance that they will recover and be able to continue their (life-saving) work. These arguments however are not a matter of fairness or equity, and they also apply to a much broader group of persons who are important for saving the lives of others but do not run increased risk, including, for example, vaccine producers.

Some Converging Implications (and the Questions They Raise...)

So far I have explored and discussed the various general implications of concerns of efficiency and equity with respect to allocation of scarce resources during a pandemic. Although these implications may often point in different directions, there are at least some points of convergence. The more a specific policy can be supported by appeal to different moral considerations—even theoretical accounts that are often considered as counterparts, such as consequentialist and non-consequentialist theories—the more the policy can be considered reasonable and justified. I have already argued that *saving the most lives* is a general policy aim that can be justified from such different theoretical approaches. Before discussing two more specific points of convergence (priority for specific health care works or pandemic responders, and triage criteria for critical care) let me briefly discuss some more general policies.

On a very general level, the policy strategies which the WHO recommends in the various stages of pandemic preparedness and response (WHO 2005a, 2005b), seem consistent with any of the ethical accounts I have discussed. In case of a first outbreak, rapid response is essential, aiming at containment at the source. By combining antiviral prophylaxis with strict non-medical public health strategies (isolation, social distancing) there might be a chance that the epidemic will be contained. If necessary, countries may even have good reason to donate part of their antiviral stockpiles if the country in which the outbreak occurs would not have enough resources to contain the epidemic. Such interventions may save the most lives and, hopefully, some regions might remain unaffected completely. If the outbreak cannot be contained, a next aim is to prevent, as long as possible, the introduction of the virus into non-affected populations, again by means of prophylactic use of antivirals and other, non-medical public health measures. This helps to gain time for more effective policies/interventions such as development and production of a pandemic vaccine. If the introduction of the pandemic virus in a new region cannot be prevented, policies will aim at reducing possibilities of transmission within the population using pharmaceutical and non-pharmaceutical interventions to the limits of availability. At this stage, however, trade-offs have already emerged between using antiviral drugs for prophylaxis to inhibit further spread of the virus and, on the other hand, "saving" drugs for treatment of patients who might depend on antiviral drugs to survive. One of the central strategies at this phase of the pandemic will then be to maintain essential public health services.

Indeed, this last strategy may be the best example of convergence between (often competing) ethical approaches in priority setting during a pandemic: to protect persons who are essential for public health services. I have argued in the previous section that health care workers and pandemic responders who fulfill essential jobs in the prevention of infection and the treatment of patients *and*, who by doing so, face increased risk of infection themselves, have a strong moral (reciprocity) claim towards society to receive adequate levels of protection. Moreover, for the protection of society as a whole it is essential that these groups are motivated to continue their work in the frontline. Priority access to prevention and treatment is therefore not just a matter of fairness; it can be supported on utilitarian grounds as well. This does not necessarily mean that these "frontline workers" should be given priority access to any form of medical treatment. It makes sense to offer pandemic responders who assume extra risk personal protective equipment and possibly antiviral prophylaxis (depending on availability); to vaccinate them as soon as vaccine is available; and to treat them with antiviral drugs if they get ill. The latter treatment may also enable them to go back to their work if they recover from the disease. It is less obvious that a pandemic responder, who becomes ill and develops respiratory failure, should also be given priority access to intensive care and mechanical ventilation—that is, to give her priority over other citizens who have the same respiratory problems. One might argue that these pandemic responders already received a relatively high level of protection compared to others,

which makes it less clear why fairness would support prioritizing them for mechanical ventilation as well. The utilitarian argument—that the pandemic responder would go on saving lives after he will have recovered from respiratory problems—also seems less convincing. Full recovery might be uncertain and, moreover, take a long time.

The allocation of critical care, however, may be another example where ethical considerations do converge, even though the moral decisions to be made are difficult and painful. Marsh (2006) estimates that in the UK four to five times as many intensive care beds (than are currently available) would be needed to treat all persons who are in need of mechanical ventilation. In contrast to other allocation contexts, decisions in the critical care department will have immediate consequences for the lives of patients who are and who are not selected for treatment. Arguably patients should only be referred to critical care if they really need mechanical ventilation or other basic life support; hence, those who are referred but cannot be admitted due to scarce resources might die within a short time. Nevertheless, the ethical dimensions of allocation of mechanical ventilation are, in some respects, less complex than many other decisions—although this does not imply that decision-making is easy. First, all patients who are eligible for ventilation treatment are equally worse off in terms of their immediate risk of dying. Second, arguably the role of indirect benefits ("by saving this person's life we will also secure additional benefits") in intensive care is minor. Several commentators propose that, in a pandemic, critical care triage should be based upon the principle to help the greatest number of people survive the crisis (Marsh 2006; Hick and O'Laughlin 2006). Indeed, as argued above, the principle to save the most lives may be justified by appeal to consequentialist and non-consequentialist theories. This may involve prioritizing patients who have the best prospects of surviving with ventilation, but also to giving lower priority to patients who are expected to require a ventilator or intensive care bed for a relatively long time. Several proposals for medical criteria on this basis have been published (Hick and O'Laughlin 2006; Christian et al. 2006). One of the controversies in such triage criteria is whether age should be a factor to include. Age might be a predictor of the chance of survival in critical care, though possibly not a reliable one (Christian et al. 2006). However, there are also other reasons for giving priority to patients who are relatively young: the fair innings argument (a non-consequentialist argument) and also the expected life years saved (a consequentialist argument).

There will be more points of convergence with respect to allocation of scarce resources, but these will depend more strongly on the specific epidemiological characteristics of the pandemic. For example, if pandemic vaccine is available, different normative arguments could justify giving priority to vaccination of children. Such a policy could be supported again by appeal to the fair innings argument and possibly by appeal to the principle to maximise expected life years (or DALYs or QALYs) saved. But if children are "superspreaders", then vaccinating them might reduce the risks of many other members of society as well (Longini et al. 2004). On the other hand, it could be that vaccinating especially the highest risk groups would ultimately save more lives. Moreover, some suggest that public health measures that aim at social distancing (closing of schools, etc.) could diminish children's role as superspreaders, and then part of this justification would break down.

Allocation of Medical Resources and Constraints on Liberty

Most of the papers in this special issue of the *Journal of Bioethical Inquiry* focus on infectious disease control interventions that set constraints on people's liberties. Isn't liberty also a relevant value with respect to rationing of scarce medical resources? In a fundamental sense, concerns about liberty are relevant indeed. Instead of reflecting on how the state and public health authorities should allocate scarce antiviral drugs or vaccines, a relevant question could have been whether such allocations should better be left to the market. Choosing for state control involves giving less weight to people's liberty than to the goals of public health. Although a general discussion of the role of liberty goes beyond the scope of this paper, it makes sense to briefly discuss a specific example where liberty is at stake, because it suggests some conclusions for the relative weight of the principles of saving the most lives and of equitable access.

Should individuals be allowed freedom to buy their own pharmaceutical protection—for example, a per-

sonal stockpile of antiviral drugs? One of the problems with personal stockpiles of oseltamivir is that the drugs may be used in insufficient doses or inadequate courses of therapy. This could lead to the emergence of oseltamivir-resistance in the influenza virus, and thus undermine the effectiveness of antiviral therapy worldwide (Moscona 2005). Assuming that the state is justified in constraining people's freedom if necessary to prevent harm to others—the harm principle (Mill 1859)—there are good reasons for not allowing personal stockpiling.

A different line of argument would be that allowing individuals and companies to build their own stockpiles (or allowing physicians to prescribe oseltamivir on demand) might undermine the attempts of governments to create a sufficient stockpile for public health purposes, and hence obstruct the distribution that was aimed for in the plans for pandemic preparedness and response (Cf. Brett and Zuger, 2005). Something similar might happen with the currently available H5N1 vaccine. Suppose that the H5N1 virus became easily transmissible from human to human, and the vaccine still offered protection against the new virus. It would then be rational for individuals to buy H5N1 vaccine (or get a prescription) but governments would simultaneously try to build a stockpile of vaccine for public health purposes. Given that vaccine supplies and production capacity are limited, free sale or prescription of vaccine would undermine public health goals (either by draining the supplies, or by raising the price), which could be a reason for the state not to allow individuals to buy vaccination for themselves.

However, this would imply that the state does not allow individuals to protect their own lives, which is a very basic infringement on personal freedom. Can such an infringement be justified by appeal to public health goals? This depends on what the goals are, and to what extent they can be attained. Following the argument in this paper, the public health goals would involve using resources in a way that saves the most lives but also promotes equitable access. A policy that constrains people's freedom and opportunities to protect their own lives can be more easily justified by arguing that this is necessary to save as many lives as possible, than by arguing that the policy will lead to a more equitable distribution of drugs or vaccine. For a consequentialist—focusing on maximising aggregative value—this will be obvious. Liberals and libertarians however may support this line of argument as well because the "saving the most lives" justification fits within the framework of the harm principle. On the other hand, to constrain people's freedom to protect themselves, in order *to secure a more equitable distribution* of protection, would be much more controversial, as it may neither find support in the harm principle, nor in consequentialist concerns. If this rather tentative analysis could be developed and strengthened, it will have implications for the relative weight of efficiency and equity in rationing policies. Where rationing policies require constraints on people's freedom to self-protection, governments would have reason to give more weight to *saving the most lives* than to securing *equitable access*.

Conclusion

Throughout this paper I have argued that there is a reasonable ethical basis for rationing scarce medical resources during an influenza pandemic. Although the principles of utility and equity will often conflict and, moreover, both can be interpreted in different, often diverging ways, there are also converging lines of argument. On a general level, *saving the most lives with given resources* is a defensible interpretation of the principle of utility which can also find support from non-consequentialist approaches. On a practical level I have argued how utility and equity can jointly support policies that prioritise the protection of health care workers. Both principles will also allow allocating intensive care in a way that gives priority to patients who are expected to need mechanical ventilation for only a relatively short period. Finally, depending on the characteristics of the pandemic, there might be good reasons for prioritising protection of young children and young adults over older persons.

Obviously, in numerous situations and scenarios for pandemic planners moral conflict is inevitable. Policies for pandemic preparedness and response should therefore not only be based upon substantive moral principles like utility and equity, but also promote procedural fairness and accountability (Daniels 2008; Verweij 2008). Nevertheless, some policies can be supported by appeal to such diverging principles as utility and equity, and this conclusion may encourage bioethicists, influenza specialists and policy makers to seek and test more points of convergence.

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