The effect of information provision on support for saving more lives♣

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Abstract

Public health strategies to deal with pandemics, including Covid-19, are primarily guided by the principle of saving more lives. Public opposition towards the recommendations and directives of health authorities suggests that a sizeable fraction of the population may not subscribe to the same principle. Using a randomized controlled experiment, we examine whether providing information about the competing ethical considerations that guide public health strategies affects the individual preferences for saving more lives, and the likelihood of social agreement on this principle.

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1. Introduction

Most public health strategies during the Covid-19 pandemic are guided primarily by the principle of saving more lives (Emanuel et al. 2020, Iacobucci 2020). Social distancing guidelines and lockdown measures to 'flatten the curve' so that healthcare systems are not overwhelmed at any given time are primarily motivated by this principle (Sen-Crowe et al. 2020, Greenstone and Nigam 2020). Similarly, the protocols for allocating scarce life-saving medical resources such as ventilators and ICU beds are primarily guided by the principle of saving more lives (Emanuel et al. 2020, Peterson et al. 2020, White and Lo 2020, New York Task Force on Life and the Law 2015, Persad et al. 2009).

However, anti-lockdown demonstrations and public outcry against some guidelines for allocating ventilators during the Covid-19 pandemic suggest that a sizable fraction of the population may not accept the primacy of the principle of saving more lives.[1] Public outcry against lockdown measures may not only due to economic considerations but also due to the belief that Covid-19 is fatal mostly for the elderly who have had their fair-innings and people with co-morbidities who are left with limited life-years (Miles et al. 2020). If people do not subscribe to the principle of saving more lives, then they may be more likely to oppose public health strategies geared towards saving more lives.

Understanding the source of the potential tension between the general public and the health authorities is crucial because strategies derived from a principle that people personally subscribe to, and believe others will also subscribe to, are likely to incentivize individuals to act in the desired ways to overcome the Covid-19 pandemic. Here, we hypothesize this tension may partly be due to *two* important features of the deliberative process through which public health strategies arise.

Public health recommendations typically arise from extensive deliberations between medical professionals, government officials, and bioethicists, among others. This process necessarily requires the deliberators with potentially different personal opinions to (**1**) reason through the

[1] See https://www.wbur.org/commonhealth/2020/04/20/mass-guidelines-ventilator-covid-coronavirus for the public outcry against the guidelines used by the state of Massachusetts. For instances of resistance to lockdown measures, see https://www.bbc.com/news/world-us-canada-52417610 and https://jp.reuters.com/article/us-health-coronavirus-germany-protests/i-want-my-life-back-germans-protest-against-lockdown-idUKKCN2270RD.

competing ethical considerations, and (**2**) arrive at broad *agreement* on public health strategies. In contrast, members of the general public may not reason through the competing ethical considerations or have sufficient information to do so. Further, they may be more inclined to view the pertinent issues more from their personal perspective and less inclined to ask what strategies would be agreeable to the community as a whole.

This research examines whether these two differences between the deliberative processes of members of the general public and the public authorities contribute to the potential tension between them regarding the primacy of the principle of saving more lives. We will conduct hypothetical choice experiments involving allocation of scarce ventilators among Covid-19 patients. The experiment will help investigate whether decisions consistent with the principle of saving more lives among the general public increases if (1) people are provided *information* that helps them reason through the competing ethical considerations, and (2) people have to think about which principle is *socially focal*, i.e., the most likely principle upon which an agreement may emerge despite differences in their personally preferred principles.

We use allocation of scarce ventilators as the specific context to answer our broad questions because it helps highlight in a simple and clear way that the principle one adopts has significant consequences for who survives and how many survive. Publicly available ventilator allocation guidelines also provide the competing ethical considerations that underpin the extensive deliberations between medical professionals, government officials, and bioethicists, among others. Our focus on information about the competing ethical considerations is consistent with the call by the World Health Organization to member states to manage the 'infodemic' during the Covid-19 pandemic by combating misinformation and disinformation while respecting freedom of expression.[2]

This information is not intended to prime the participants to favor any particular principle. Instead, our goal is to investigate which principle is personally most preferred and most likely to achieve social agreement when people become aware of the competing ethical considerations. Our findings

[2] https://www.who.int/news-room/detail/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation.

cannot answer which principle is the best. They will help answer whether awareness about the competing ethical considerations can help reduce the seeming opposition towards public health strategies that primarily seek to save as many lives as possible.

2. Experimental design

The Covid-19 pandemic has brought the attention of the general public to the ethical question of whose lives to save when there is a shortage of scarce medical resources. As Covid-19 has spread around the world, many individuals infected with the virus have experienced severe respiratory symptoms, requiring intensive care as well as ventilators for breathing support.[3] Even after mobilizing all available resources, hospitals in some severely impacted regions have continued to face shortages of ventilators and other life-saving medical equipment.[4] This has forced medical authorities to make decisions about which patients need to be prioritized.[5]

Most of the pre-existing guidelines for allocation of scarce medical resources during a pandemic, and those developed after the onset of the Covid-19 pandemic, are primarily geared towards saving more lives. For instance, patients that are unlikely to survive without a ventilator, but highly likely to survive if they receive one, are prioritized. In addition to the survival chances conditional on receiving a ventilator, the guidelines consider several other factors (e.g., age, status as a healthcare worker, and presence of co-morbidities).

There exist some notable differences across different guidelines. For instance, some guidelines recommend categorically excluding patients with certain health conditions while others do not categorically exclude any patient.[6] These differences have direct implications for who lives and who dies. While the guidelines are the outcome of a deliberation between medical professionals, bioethicists, and public health authorities, apart from some exceptions the input from the general public has been fairly limited in developing these guidelines.[7] The importance of understanding public attitudes is highlighted by the recent experience in Massachusetts where the guidelines had

[3] https://www.bbc.com/news/health-52036948
[4] https://www.nytimes.com/2020/03/18/business/coronavirus-ventilator-shortage.html
[5] https://www.nytimes.com/2020/03/24/upshot/coronavirus-rationing-decisions-ethicists.html
[6] https://www.nytimes.com/2020/03/31/us/coronavirus-covid-triage-rationing-ventilators.html
[7] https://www.washingtonpost.com/outlook/2020/03/12/us-hospitals-may-have-ration-care-during-pandemic-heres-one-approach/

to be revised within two weeks after the initial release in April 2020 in order "to prevent unconscious bias against people of color, people with disabilities and other community members who are marginalized."

We will examine our research questions using a randomized controlled choice experiment. The experiment will involve a target sample of 600 adult participants in the US, who are demographically representative of the US population. The participants will be recruited via Prolific, a UK-based crowdsourcing survey and research platform, to participate in the online experiment between October 2020 and December 2020. The experiment will take approximately 30 minutes to complete. Each participant will be paid GBP 2.50 for completing the experiment and could earn up to an additional GBP 2.50 depending on their responses.

The experiment has several components. Table 1 summarizes the components that participants in the control group and treatment group will face during the experiment.

2.1 Background and Quiz

First, participants will be asked to indicate their exposure to Covid-19, willingness to be vaccinated when a vaccine becomes available, and their familiarity with the guidelines for allocation of scarce medical resources during a public health emergency. Participants will then answer a number of quiz questions and will earn a bonus for correct answers. These quiz questions will be structured to provide background information to familiarize participants with the setting and the decisions they will make in the choice experiment.

Table 1: Components of the experiment

	Control group	Treatment group
Background and quiz	Yes	Yes
Information treatment		Yes
Stage 1 choice experiment	Yes	Yes
Stage 2 choice experiment	Yes	Yes
Survey questionnaires	Yes	Yes

Incentivizing participants to answer the quiz questions correctly will help ensure they read the information carefully and understand the structure of the problems they will face in the choice experiment. It will also provide a measure to identify participants who are relatively more likely to provide reliable responses in the choice experiment (see details about sample selection issues in section 4.3). Participants will be provided the correct answer and the explanation for each question irrespective of their answer being correct or incorrect. The explanations will further improve participants' understanding of the choice experiment they will face later.

2.2 Intervention: Information Treatment

The information treatment is assigned randomly to half of all the participants. Participants assigned to the information treatment constitute the treatment (informed) group. The informed group will be provided the core arguments *for and against* utilizing four criteria discussed in ventilator allocation protocols – age, occupation as a critical care worker, presence of comorbidities, and survival chances conditional on receiving a ventilator – to determine who should receive the available ventilators. We randomize the order in which different informed participants see the information about these criteria.

We will provide arguments both for and against each of these four prioritization criteria to prevent priming participants for or against the principle of saving more lives. Our aim is to ensure the participants understand that there exist competing ethical considerations and a variety of principles (e.g., saving more life-years, saving lives that are instrumental to keep the economy and healthcare system functioning), each with different implications for who lives and who dies. We do not consider treatments that provide one-sided or biased information because we do not consider such a strategy to be a viable and credible strategy as it may undermine long-term trust and confidence in health authorities despite a potential short-term positive impact.

After informed participants read the two-sided information -- arguments and the counter-arguments in relation to a prioritization criterion -- they will be asked a question to ensure they think about the arguments on their own. Table 2 summarizes the arguments and counter-arguments in relation to each of the four prioritization criteria (Appendix A provides the details).

Table 2: Summary of the arguments and counter-arguments

Prioritization Criterion	**Argument**	**Counter-argument**
Young age	Fair-innings for the young	Discriminates against elderly
Healthcare worker	Insurance for the risks borne	Many others are also critical
No comorbidities	Efficient use of resources	May discriminate against some
High survival chances	More lives can be saved	May discriminate against some

The other half of participants are assigned randomly to the control (uninformed) group that is not provided any information about the prioritization criteria.

2.3 Stage 1: Personal Choice

During Stage 1 of the choice experiment, participants are presented five hypothetical scenarios (one at a time). Each scenario describes eight patients who have contracted Covid-19. Each patient needs a ventilator to survive Covid-19, but there is a shortage of ventilators. Patients differ in their age and occupation characteristics, as well as their chances of surviving Covid-19 *conditional* upon receiving a ventilator. Table 3 lists the eight hypothetical patients.

Table 3: Characteristics of the Eight Hypothetical Patients

Patient	Age or occupation group	Survival chances after receiving a ventilator
E1	75-year-old elderly	60%
E2	75-year-old elderly	90%
A1	45-year-old general adult	60%
A2	45-year-old general adult	90%
D1	45-year-old doctor	60%
D2	45-year-old doctor	90%
C1	5-year-old child	60%
C2	5-year-old child	90%

In each of the five scenarios, participants will have to choose a specified number of patients who they think should receive the available ventilators. In each scenario a participant needs to engage in individual reasoning and ask "what should *I* do". The five scenarios differ in how many and

which of the patients have co-morbidities, as well as the number of available ventilators. A patient with co-morbidities is expected to die within two years even if the patient survives Covid-19 upon receiving a ventilator. A patient without co-morbidities is expected to live for the remainder of their natural term of life, conditional on receiving a ventilator and surviving Covid-19. The natural term of life is assumed to be 80 years of age. A patient who survives Covid-19 upon receiving a ventilator is expected to be discharged from the hospital within one month.

We construct the scenarios such that a participant's choice of patients for receiving ventilators allows us to infer whether the participant personally subscribes to the principle of saving more lives, saving more life-years, or some other principle. Table 4 lists the five scenarios and the patient choices consistent with the principle of saving more lives and the principle of saving more life-years. Note that there is a fixed number of available ventilators in a scenario, and the participants choose which patients should receive the available ventilators. Hence, the patient choices consistent with the principle of saving more lives in a scenario corresponds to the maximum *expected* number of lives that can be saved in the scenario given the conditional survival chances of the patients. Similarly, the patient choices consistent with the principle of saving more life-years in a scenario corresponds to the maximum *expected* life-years that can be saved in the scenario.

Table 4: The Five Scenarios in the Choice Experiment

Scenario	Comorbidity condition	No. of ventilators	Max possible expected saving of:		Patient choices for saving more lives	Patient choices for saving more life-years
			Lives	Life-years		
S1	No one	4	3.6	175.5	E2, A2, D2 & C2	A2, D2, C1, & C2
S2	E1 and E2	3	2.7	144	3 of E2, A2, D2, C2	C1, C2, & A2 /D2
S3	A1 and A2	3	2.7	144	3 of E2, A2, D2, C2	C1, C2, & D2
S4	D1 and D2	3	2.7	144	3 of E2, A2, D2, C2	C1, C2, & A2
S5	C1 and C2	3	2.7	84	3 of E2, A2, D2, C2	A2, D2, & A1/D1

Notes: See Table 2 for patient characteristics. The symbol "/" denotes "or".

There are two important features of the scenarios. First, we can uniquely identify choices that are consistent with the principle of saving more lives and the principle of saving more life-years in each scenario (see the last two columns in Table 4). Second, scenarios S2 to S5 where some

patients have comorbidities will help us investigate whether considerations regarding "quality" of life are relevant for participants who subscribe to the principle of saving more lives.

Note that participants are asked to prioritize three patients in scenarios S2 to S5. This allows us to identify whether a participant who prefers to save more lives is nevertheless oriented towards saving patients without comorbidities. Table 5 lists patient choices in scenarios S2 to S5 that reveal a participant takes the quality of life into consideration. We term these choices as being consistent with saving "healthy-lives".

Table 5: Choices that are consistent with saving more healthy-lives

Scenario	Comorbidity condition	No. of ventilators	Saving more healthy lives
S2	E1 and E2	3	A2, D2, and C2
S3	A1 and A2	3	E2, D2, and C2
S4	D1 and D2	3	E2, A2, and C2
S5	C1 and C2	3	E2, A2, and D2

For example, the only choice of three patients in scenario S2 consistent with saving more healthy-lives is A2, D2, and C2. Choices consistent with saving more lives but inconsistent with saving healthy-lives will be classified as choices consistent with saving "any-lives".

2.4 Stage 2: Coordination Game

During Stage 2 of the choice experiment, participants will again be presented with the same five scenarios listed in Table 4. In each scenario, a participant will earn a bonus of GBP 0.20 if and only if their choice of patients is identical to the patients most frequently chosen by all the participants in that scenario.

This incentive structure implies the Stage 2 interaction is a coordination game that incentivizes participants to think which patients are most likely to be prioritized by the other participants. The choices made by the participants in the coordination game will therefore allow us to infer which principle is socially focal, i.e., the most likely ethical principle upon which an agreement among people may emerge despite differences in their personally preferred ethical principles.

The coordination stage in the treatment may be viewed as simulating the decision environment a committee faces while deliberating about the ventilator allocation protocol. Different members may have different personal views. The deliberation among the committee members will inevitably involve a discussion of the arguments for and counter-arguments against using any criteria to prioritize patients. At the same time, the ultimate goal of the committee is to arrive at an agreement about the protocol among themselves after discussing all the competing ethical considerations.

Decisions made in the coordination stage by the participants in the treatment group may thus be interpreted as indicating what the general public may come up with when they are placed in the same decision environment as faced by a committee in charge of formulating a ventilator allocation protocol. In contrast, the personal choice stage in the control (treatment) is closest to the decision environment faced by an individual member of the general public who is unaware (aware) of the competing ethical considerations.

2.5 Post-experimental questionnaire

The last part of the experiment will ask participants demographic, socioeconomic, and attitudinal questions to collect information such as age, gender, educational attainment, marital status, household structure, and political leaning. It will also include a 3-item cognitive reflection test that can be informative about a participant's disposition to reflect before making decisions (Frederick, 2005).

3. Analysis

In this section, we describe the outcome measures, some sample selection issues, the estimating equations, and the hypotheses to be tested.

3.1 Outcome measures

The primary outcome variables are:

1. A binary variable (*Save lives*) indicating whether or not a participant's choice of the patients to receive ventilators in a scenario is consistent with the principle of saving more lives (as listed in Table 4). This save lives variable can be decomposed into two subgroups according to the definition of saving more healthy-lives in Table 5.

2. A binary variable (*Save life-years*) indicating whether or not a participant's choice of the patients to receive ventilators in a scenario is consistent with saving more life-years (as listed in Table 4).
3. A binary variable indicating whether or not a participant's choice of the patients to receive the available ventilators in a scenario is inconsistent with both saving more lives and saving more life-years.

The above primary outcome measures are defined primarily at the participant-scenario level.

3.2 Sample selection for analysis

The responses provided by some participants may not be reliable. It is possible that some participants do not pay attention to the background information despite the payment to incentivize them to understand the problem fully. In order to ensure that the data used for the main analysis is reliable, we will exclude participants who incorrectly answer quiz questions that specifically test whether a participant understand that (i) patients who do not receive a ventilator are expected to die within one week, and that (ii) the survival chances described in each scenario are *conditional* upon receiving a ventilator. Understanding these two points is central to understanding the core dilemma. In our sensitivity analysis, we may also restrict the sample to individuals passing a certain threshold of understanding of the problem based on their overall performance in the quiz and validation questions.

3.3 Main Estimation

We will estimate the following equation:

$$y_{ij} = \alpha + \beta T_i + \gamma C_j + \delta\left(T_i \times C_j\right) + \epsilon_{ij} \qquad (1)$$

The outcome y_{ij} is the indicator for whether the choice of patients by participant i in scenario j is consistent with the principle of saving more lives. The dummy variable T_i takes the value 0 for participants in the control group and 1 for the participants in the treatment group. The dummy variable C_j takes the value 0 for observations in Stage 1 where participants report their

unincentivized personal choices and 1 for observations in Stage 2 where participants report their incentivized coordination choices.

The coefficient α is the likelihood of personal choices being consistent with the principle of saving more lives among participants in the control group; and, the coefficient β provides the effect of the two-sided information on the likelihood of personal choices being consistent with the principle of saving more lives. The coefficient γ provides the difference between the likelihood of participants personally subscribing to the principle of saving more lives and the likelihood that this principle is socially focal among participants in the control group. The sum $\alpha + \gamma$ thus indicates the likelihood that the principle of saving more lives is socially focal; and, the sum $\beta + \delta$ provides the effect of the two-sided information on the likelihood that the principle of saving more lives is socially focal. As described in Section 2.4, a positive and significant value of $\beta + \delta$ would imply that when members of the general public are placed in a decision environment similar to the one faced by health authorities, then the support for the principle of saving more lives increases.

We will also estimate equation (1) using the indicator for the decision made by participant i in scenario j is consistent with the principle of saving more live-years.

As public health authorities often take comorbidity conditions into consideration in their allocation protocols, we will also separately estimate equation (1) using the indicator for whether the decision is consistent with the principle of saving more healthy-lives and the indicator for whether the decision is consistent with the principle of saving more of any-lives, among choices that are consistent with the principle of saving more lives. The results will allow us to assess whether participants who choose to save more lives take the quality of lives into consideration.

We will report all the estimates graphically (bar charts) to ease understanding and interpretation.

3.4 Sub-group Analysis

We are interested in four key dimensions to perform sub-group analysis using equation (1). Our focus will be on comparing differences across the control/treatment groups and stages by (i) experience with Covid-19, (ii) attitudes towards vaccination, (iii) cognitive style, and (iv) age.

Personal experience with Covid-19 is likely to change an individual's perception about medical emergency and death, as well as the importance of saving lives. We capture this personal experience with Covid-19 using survey questions about whether the participant: (i) personally had Covid-19 at any point, and (ii) personally knew someone who had Covid-19. We code a participant as being personally exposed to Covid-19 if the participant answers yes to either one or both of the questions.

Anti-vaccination attitudes go against the recommendations and strategies of public health authorities. We expect individuals with anti-vaccination attitudes to differ from other individuals in their preferences towards saving lives. We will capture anti-vaccination attitudes using a specific survey question regarding willingness to be vaccinated with a potential Covid-19 vaccine that the health authorities deem safe and is provided by the government for free. Individuals answering no to this question will be coded as "anti-vax."

The third dimension relates to the cognitive style of the participant as measured using the Cognitive Reflection Test (CRT). We expect the impact of information on choices regarding which patients should receive the available ventilators may vary between participants who score low versus high on the CRT. Finally, we will also investigate whether the likelihood of decisions being consistent with saving more lives increases with the age of the participants.

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Appendix A

Information Treatment (based on one random order)

We will now highlight an argument and a counter-argument for prioritizing patients for receiving ventilators if they contract Covid-19, on the basis of each of the four main criteria: age, occupation, co-morbidities and survival chances.

You will be asked a question about each criterion.

1. Prioritizing younger patients

An argument for prioritizing younger patients over older patients is that it allows the young to have a fair chance to experience all stages of life, and saves more life-years.

A counter-argument is that this clearly discriminates against the elderly and may not account for economic or public health considerations. It is debatable whether the right to life of the elderly can be ignored to satisfy the right to a long life of children and adults. Further, from an economic and public health perspective, general adults and healthcare workers may be more likely to keep the economy and the healthcare system functioning.

Question. In your view, which 2 out of the following 4 statements are most likely to be true?

- Prioritizing younger patients may result in more life-years being saved
- Prioritizing elderly patients may result in more life-years being saved
- Prioritizing adult patients over children or the elderly hurts the economy
- Prioritizing younger patients discriminates against adult and elderly patients

2. Prioritizing doctors and nurses

An argument for prioritizing healthcare workers is that society should provide some insurance to healthcare workers for the risks they face in caring for others. One way to do this would be to prioritize healthcare workers for receiving ventilators, if they contract Covid-19 while caring for others.

A counter-argument is that healthcare workers (i) should have priority in receiving Personal Protective Equipment so that they do not get sick, but (ii) if they get sick while working, then they should be regarded as a general member of the population and should not have priority in receiving ventilators.

> This counter-argument highlights the difficulties in clearly distinguishing between "*critical*" and "*non-critical*" healthcare workers, since the smooth operation of health services during a pandemic relies on a whole range of workers in the healthcare sector, not just doctors and nurses. In addition, one may ask, why not prioritize "critical" workers in occupations other than healthcare. For example, adults who are not healthcare workers may contribute significantly to keep the economy going during a pandemic.

Question In your view, which 2 out of the following 4 statements are most likely to be true?

- Prioritizing doctors and nurses provides them some insurance if they get sick while caring for others
- Prioritizing doctors and nurses does not provide them any insurance if they get sick while caring for others
- Adults who are not healthcare workers may be critical to society from an economic perspective
- Doctors and nurses are the only critical workers in a public health emergency

3. Prioritizing patients without co-morbidities

An argument for prioritizing patients without co-morbidities is that if ventilators are given to patients with co-morbidities, then scarce medical resources will get wasted because patients with co-morbidities are unlikely to live long even if they fully recover from Covid-19.

A counter-argument is that this *discriminates* against certain groups (e.g., some ethnic or racial groups, and some income groups) who may be systematically more likely to suffer from chronic illnesses.

Question In your view, which 2 out of the following 4 statements are most likely to be true?

- Prioritizing patients without co-morbidities may allow less life-years to be saved
- Prioritizing patients without co-morbidities may allow more life-years to be saved
- Prioritizing patients without co-morbidities implies that no group is discriminated against
- Prioritizing patients without co-morbidities may imply that some groups are discriminated against

4. Prioritizing patients with higher survival chances

An argument for allocating ventilators solely on the basis of who is more likely to survive Covid-19, if they receive a ventilator, is that more number people be saved on average.

A counter-argument is that this may *implicitly* discriminate against some groups of people. For example, people from *low socio-economic backgrounds* may be much more likely to get seriously sick if they contract Covid-19. This could be due to the poor environment they live in, the high-risk occupations they work in, and lack of nutrition or health services.

Question In your view, which 2 out of the following 4 statements are most likely to be true?

- Prioritizing patients with higher survival chances means that fewer people can potentially be saved
- Prioritizing patients with higher survival chances means that more people can potentially be saved
- Prioritizing patients based on their chances of surviving Covid-19 may implicitly discriminate against some groups of patients
- Prioritizing patients based on their chances of surviving Covid-19 neither implicitly nor explicitly discriminates against any group of patients