FREAKONOMICS

Who Gets the Ventilator? (Ep. 413)

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by **Stephen J. Dubner**
Produced by **Zack Lapinski**

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Should a nurse or doctor who gets sick treating Covid-19 patients have priority access to a potentially life-saving healthcare device? Americans aren't used to rationing in medicine, but it's time to think about it. We consult a lung specialist, a bioethicist, and (of course) an economist.

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Here's a question for you. Let's say there's a pandemic, a fatal virus working its way around the world. There's no therapeutic treatment yet, but there is one piece of equipment that gives critically ill people at least a chance to survive. And let's say the demand for this equipment outstrips the supply — there just aren't enough units for the number of people who need it.

So: how do you decide who gets priority? Should it be first-come, first-served? Should it be the very sickest people? Or perhaps the least-sick of the very sick, since they'll have a better shot at survival? Should it be older people, who may be fragile; or younger ones, with more life left to live and, theoretically, more to contribute to society? Should the wealthy and powerful have privileged access to this life-extending equipment, as they have access to most other resources? Or should it be reversed, with priority going to the poor and powerless?

There's one more category I'd like you to consider: what about doctors and nurses and other healthcare workers? Since they're the ones treating the victims and putting themselves at higher risk of exposure, should they move to the front of the line if they get sick? How you answer these questions probably says something about how you view the world generally. If, for instance, you're an economist, you think about the most efficient ways to allocate scarce resources. But if you're a frontline healthcare worker, you may think it's only fair to balance efficiency with some sense of reciprocity. And how do you think about this question if you're this person?

> *Parag PATHAK: My name is **Parag Pathak**. I'm a professor of economics at M.I.T.*

Okay, that's the economist part. But also:

> *PATHAK: So my wife is a physician and my sister is an emergency room doctor.*

As it happens, Pathak's research specialty is particularly suited to this sort of dilemma. It's called market design.

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> *PATHAK: So that is a branch of microeconomics that tries to devise practical schemes for real-life resource-allocation problems like getting your kid into school, or how can you increase your chances of getting a kidney if you didn't have one. What I'm really excited about are situations where, we have to be very precise about how things get rationed, situations where supply and demand don't have the usual instruments for the market to clear.*

The "usual instruments," meaning prices.

> *PATHAK: So a situation where there's no price — usually, if there's more demand than supply, the price goes up. If there is not enough demand, the price goes down. But in a lot of the problems I've studied, we have to think about equilibrating the market in a different way.*
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> *Stephen J. DUBNER: So does this still feel like economics to you or does it put you into the realm of ethics or philosophy or something else?*
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> *PATHAK: Well, a lot of the times when you can't use price, we have to ask the question, "Why?" And that opens the door to — exactly, philosophy, ethics, considerations that I think are a little difficult for economists to wrestle with.*

For instance, during this Covid-19 epidemic:

> *PATHAK: I started to look at some of the guidelines about what do you do when there's not enough ventilators.*

A ventilator, as you likely know, is a piece of hospital equipment that can help keep alive someone with respiratory failure. Pathak and some colleagues started reading different states' guidelines for how to prioritize ventilators in a potential shortage.

> *PATHAK: And so there's some interesting tidbits in the New York document that really got us thinking. And one of the tidbits was a statement in that guideline that said, we do not think that essential personnel or frontline health workers should be prioritized. And, here I am talking to my spouse, who is trying to find a way to get N-95 masks online. And my sister is looking at different face shields for welding from Home Depot before she goes into the emergency room. And I asked them, "What do you think about this?" And they both said, "This is crazy." But New York's rationale was based on the idea that if we give essential personnel the highest priority, then we could be in a state where a hospital has 20 ventilators and they only go to essential personnel. And that got me thinking.*

It got us thinking too. Today on *Freakonomics Radio*: we'll speak with a medical ethicist about healthcare rationing.

> *Zeke EMANUEL: First-come, first-served is the absolute worst principle you can think of in this situation.*

A leading pulmonologist on the need for a better principle, and fast.

> *MeiLan HAN: The hospitals are bursting at the seams. I have friends who are writing their wills.*

And the economist on a potential solution.

> *PATHAK: I think most of these plans would like to prioritize frontline workers. They just don't know how to.*

* * *

There are so many unknowns about Covid-19 that it's hard not only to keep straight what's known, but we're constantly discovering that what we knew yesterday isn't quite so true today. And by next week it may be totally invalid. One concern over the past couple of months is that many people will need mechanical ventilators to keep them alive, and that there aren't nearly enough ventilators to go around. Keeping in mind these numbers are changing all the time, let's start with the current assumptions on ventilator demand and supply.

> *PATHAK: The best numbers I've seen on this are aggregate numbers.*

That, again, is the M.I.T. economist Parag Pathak.

> *PATHAK: There are full-featured ventilators. There is about 70 to 80 thousand of those, including, ten to 20 thousand from the strategic national stockpile. And then there's a partial-feature ventilator, and there's about 100,000 of those. And if you think about the numbers from Italy, about ten to 20 percent of those hospitalized require a ventilator. So that takes us to about two million* ***at least****.*
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> *DUBNER: And even if those are spread out over three months, the 100 or 200 thousand numbers start to look pretty scary.*
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> *PATHAK: It looks very scary. Also just to mention in terms of the supply-demand calculation is: a lot of the ventilators that we had in the United States were not just sitting idle. They were already being used for other types of ailments.*

In **New York State**, for instance, about 85 percent of ventilators are typically in use during normal conditions. Which makes sense — a ventilator is an expensive piece of equipment; a hospital doesn't buy one just to have it sit idle. So a big share of those one or two hundred-thousand existing ventilators were already in use. There's also the issue of whether the available ventilators are situated where they're needed.

> *PATHAK: How those are split across states is a big open question. And it's actually another area where economists have started to think, if only we had a national registry that said, there's an excess supply of ventilators in Idaho and there's a shortage in New York City, why don't we transport some of those Idaho ventilators to New York?*
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> *DUBNER: And a national registry does not exist because why?*
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> *PATHAK: I don't know. I think in part it's because medical services in the U.S. are fairly decentralized.*

The purchasing of ventilators, like most other expensive medical equipment, is often left to individual hospital systems. Capacity, therefore, varies from hospital to hospital. With Covid-19, the overall capacity is thought to be way too low — which is why the federal government and others have been **frantically ramping up ventilator production**. Will all those ventilators be needed? If needed, will they be effective? Those questions are unanswerable for now.

In New York, it was predicted there would be a massive surge in ventilator demand, and therefore a massive shortage; thankfully, that hasn't come to pass. At least not yet. But if there are shortages, the issue of how to ration a ventilator will be an incredibly difficult and important one. The idea of outright rationing medical resources may sound alien in the U.S., but that doesn't mean it hasn't happened.

> *EMANUEL: We have had clear situations where we, the United States, has had to allocate resources and ration.*

That's the oncologist and bioethicist **Ezekiel Emanuel**.

> *EMANUEL: I'm the vice provost of Global Initiatives, a university professor, and director of the Healthcare Transformation Institute at the University of Pennsylvania.*

Emanuel was an architect of Obamacare; he's now **advising** **Joe Biden** on Covid-19. He says there have been three major instances of medical rationing in U.S. history. Number one:

> *EMANUEL: One is insulin for diabetes. When it was first discovered in 1920, and before we figured out how to mass-produce it.*

And number two:

> *EMANUEL: A second is penicillin, which was discovered in the late 1920s, but could not be produced in large quantity until the war, World War II, created a real imperative. And they finally figured out how to produce it. But large quantities were not large enough for everyone who needed it. And so we had to ration who got it first during a war effort and even though the vast majority, 90 percent of it, went to the military, within the military there wasn't enough for everyone who could benefit from it. So we had to ration that.*

And the most recent episode of rationing: a process to treat kidney failure.

> *EMANUEL: In the early 1960s, figured out how to do long-term chronic dialysis. There weren't enough dialysis machines. It was expensive. And there was very substantial rationing there, picking the people who would get on long-term dialysis and the people who wouldn't, who would end up dying. That persisted until the federal government fully took over all the payment for dialysis, which continues till today.*

While that kind of rationing is typically in the past, Emanuel and his fellow bioethicists still have plenty to think about.

> *EMANUEL: Do you resuscitate this patient? Do you "pull the plug" on this patient? How do you use genetic tests? Do we permit embryonic stem cells or only other kinds of somatic stem cells? Do we use CRISPR technology?*

But also: there are still serious shortages in medicine.

> *EMANUEL: We have a shortage of kidneys. We have a shortage of livers. And you have to choose which patients get the organ that you have at any one time. There are rules. The rules are not without their contention. And*

> *those doctors probably have thought about it more than any other — the transplant teams — any other set of doctors.*

So how much discussion of rationing is there in medical schools?

> *EMANUEL: It's not really discussed, and not a core part of the curriculum anywhere. And I think prior to Covid-19, despite some evidence, no one really thought that this was critical.*

Emanuel was one person who did think it was critical to think about rationing.

> *EMANUEL: I wrote my first paper about this in 2006, which was basically an analysis of the Department of Health and Human Services' plan for rationing vaccines and treatments if we had an influenza pandemic. So the government had been thinking about this way back in 2005 and they came up with an initial plan. And I thought that plan was unethical because that plan said, our goal is to save the most lives.*

Wait a minute: what's wrong with a plan where the goal is to save the most lives? The H.H.S. plan made clear that older people were most likely to die in an influenza outbreak, and so:

> *EMANUEL: And so we should save them first. And that just struck me as wrong, because it emphasized saving the most lives and it ignored saving the most life-years. People who might, if you save them, live a long time.*

If you read a lot of papers written by bioethicists and health economists, there's an initialism you'll often run across: **Q.A.L.Y.** It stands for quality-adjusted life year. One quality-adjusted life year means you live a year longer at full health; if you live a full year at only 50 percent of full health, that's only half of a quality-adjusted life year.

> *EMANUEL: One of the things we know from the influenza pandemic of 1918, it was people in the prime of life — young kids up until young adults — were the most likely to die in that episode. And so if you focused in on older people, you would end up "sacrificing" younger people who had way more potential time to live.*

But the H.H.S plan prioritized older people.

> *EMANUEL: So we wrote a paper criticizing it. And then it turned out, if you survey the public, they agreed with us — that, in a pandemic, you ought to save young people and not just old people. So one of the things we ended up doing is to think through, what are the values that are really important to people in any kind of rationing situation?*

Here's one value that's embraced by nearly all bioethicists: when it comes to rationing medical services, things like race, ethnicity, or socioeconomic factors should not come into play. This, of course, is not a universal concept. Consider Saudi Arabia, where several dozen members of the royal family are reported to have Covid-19. The hospital where royals typically receive treatment was instructed to not only **prioritize those V.I.P. patients**, but to remove non-V.I.P. patients from the premises, A.S.A.P.

The U.S. had its own brushes with privileged access — for instance, when many N.B.A. players were given Covid-19 tests despite showing no symptoms, while countless civilians with

symptoms **were unable to get tested**. When you hear this kind of story, it may be natural to think that the fairest way to distribute medical care — let's say it's a ventilator — would simply be first-come, first-served.

> *EMANUEL: First-come, first-served is the absolute worst principle you can think of in this situation. It's biased in a number of ways. It's biased because people who live close to a health facility get priority. People who have traditionally been excluded from getting good healthcare — whether they're minorities or people in rural areas or others — they continue to get excluded because first-come, first-served emphasizes those people who are well into the system. Third, you might have someone who has a worse prognosis, who happens to show up first. That's a relevant criteria, but it's hardly determinative. Someone with a better prognosis ought to get those resources.*
>
> *I recognize that if you say first-come, first- served doesn't have a role and someone happens to be on a ventilator but someone else who has better prognosis comes in, and you have no other ventilators, removing a patient from a ventilator to give it to someone else is psychologically traumatic. It's very hard to do, but I think it's very important to do because it's the ethical thing to do.*

Before we go deeper into ventilator rationing, let's take a step back and learn exactly what a ventilator is.

> *HAN: In order to talk about what a ventilator is, I think it's helpful to first discuss what normal breathing does for us.*

That's **MeiLan Han**.

> *HAN: So the most important things that it does is get oxygen in, that helps our cells, and then get carbon dioxide out, which is the waste product. So when we think about a ventilator, it has to do those two things: get the oxygen in and get the carbon dioxide out.*

Han is an M.D. and professor of pulmonary and critical-care medicine at the University of Michigan. Covid-19 is fairly widespread in Michigan.

> *HAN: Within the last few weeks, the greater area of Detroit has been hit quite hard. My county was not hit quite so hard, but we've been trying to help by taking transfers from Detroit. The hospitals are bursting at the seams. They have opened up field hospitals. We are redeploying staff. But it's incredibly stressful on everyone. We have healthcare workers now that are sick. I have friends who are writing their wills.*

Han is a big deal in the field of pulmonology. She's a journal editor; she sits on scientific advisory committees. In other words, she knows a lot about how we breathe, or fail to.

> *HAN: A patient can end up on a ventilator for a huge variety of reasons. Essentially, anytime the lungs are failing to do one of its two key jobs — that could be due to pneumonia, that could be due to heart failure in some cases. Ventilators are only used in intensive-care units. It actually requires an incredible amount of resource utilization from a human perspective to keep a patient on a ventilator. Usually, we have physician teams that are going around and doing constant tweaking of the ventilators.*

A ventilator is meant to help the lungs do their job; but it doesn't work the way lungs work.

> *HAN: A ventilator actually induces something we call positive pressure breathing. The air is essentially being blown into you. If you think about how you normally breathe— normally, your diaphragm fires, the lungs expand, and actually air rushes in because of the negative pressure generated. So it's very different and actually uncomfortable for patients to go from their normal negative pressure breathing to positive pressure breathing. If you can imagine what it would all of a sudden feel like to have someone just blasting you with air and that's how you're supposed to breathe. So one of the reasons why we have to sedate patients in the I.C.U. and in some cases we actually have to paralyze them, because otherwise you get significant dyssynchrony between the patient trying to fire their own diaphragms to breathe and the ventilator trying to deliver breaths.*
>
> *That's one of the things I think a lot of people don't realize. You don't just put a patient on a ventilator and walk away. Things could be good one second and you get a call from the respiratory therapist or the nurse that, all of a sudden, the settings that were working 15 to 20 minutes ago are no longer working. So it requires really close attention to detail, a lot of tweaking and experimentation to really optimize each patient.*

When a patient comes to the emergency room in respiratory distress — let's say it's a Covid-19 patient — a ventilator is not necessarily the first step.

> *HAN: Often they have low levels of oxygen. So the first thing to do if it's not life-critically low would be to put the patients on some kind of supplemental oxygen.*

There are a few options.

> *HAN: This has actually been an area of significant debate among the medical community. But one of these options is something called high-flow nasal cannula.*

That's administered through a thin, clear tube into the patient's nose. But for the most serious cases, supplemental oxygen won't be enough.

> *HAN: When we look at that on a chest X-ray or we look at that on a C.T., sometimes we call it "White-Out." So instead of the lung being nice and black, which is the color of air on a radiographic image, all of a sudden we just see these white infiltrates everywhere.*

At this point, a patient is often put on a ventilator. They're likely to be suffering from A.R.D.S. — Acute Respiratory Distress Syndrome.

> *HAN: And prior to Covid-19, we've done tons of research studies on how best to treat A.R.D.S. regardless of the cause. And so there are certain protocols that we have in place, like keeping the size of the breaths that we deliver on the ventilator low. One of the things that people may not realize is that oxygen itself is toxic in high levels. The other thing people may not realize is that the amount of air that we push into the lungs, beyond a certain point is actually harmful, and it can actually cause lung injury.*

Because Covid-19 is a new disease, doctors around the world are frantically trying to work out how to best use ventilators against it.

> *HAN: You know, there's no time for a randomized trial of how to ventilate patients; everyone is just doing their best.*

There are a few different views.

> *HAN: One camp of thought is that we should be treating Covid-19 just like any other A.R.D.S. that we've seen, and follow the same protective protocols that we would normally follow. There is this other camp of thought that maybe this isn't really like A.R.D.S. and maybe we should be using larger lung volumes.*

Some researchers suspect that Covid-19 is attacking the lungs of some patients in a manner more similar to high-altitude pulmonary edema, where the problem has to do more with how the lung's blood vessels regulate blood flow. This would mean using a ventilator on Covid-19 patients in the way it's used to treat A.R.D.S. may be suboptimal, at best.

> *HAN: Maybe the normal rules don't apply. There certainly do seem to be certain aspects of the patient physiology that seem a little bit strange.*

One thing that doctors around the world are noticing: the way ventilators have been used to date on Covid-19 patients isn't working very well.

> *HAN: Roughly **67 percent of patients** in one U.K. database that received mechanical ventilation still died.*

In New York City, **more than 80 percent** of coronavirus patients who were put on ventilators still died. Now, keep in mind: if you need a ventilator, you're already in very bad shape; in fact, roughly half of all patients with severe respiratory distress who go on a ventilator in normal times will die. So how does MeiLan Han see the role of the ventilator in fighting Covid-19?

> *HAN: It's not going to be the panacea necessarily to get us all through, but for the patients that are severe, it is our only hope. Ultimately, if we're going to beat this, we are going to need better proven treatments. The ventilators are life-sustaining, but honestly that's while we wait for either drugs to work or for the patient to heal themselves.*

That said, a ventilator can keep a Covid-19 patient alive; it can, potentially, help them recover. Which means there will be competition for the units.

> *HAN: Yesterday, I was chatting with a friend of mine who is a pulmonologist in New York. And he told me that they were down to six ventilators and had 20 patients who needed them. So it is definitely a crisis in some hospitals.*

And how does a doctor like Han think about handling a shortage like that?

> *HAN: No one physician, no one nurse, no one respiratory therapist wants to be the one to say, "Well, Patient A, gets something and Patient B doesn't." We certainly have our own way of thinking about the likelihood of benefit. And while we don't usually like to think about that in prescribing a treatment,*

> *we are now forced to think about that. But I think what most healthcare teams that I've been working with really want are ethics boards from the hospital to come in and use ethical principles, a team-based approach, to try to decide if it comes down to it, whether this life-saving treatment should be given to Patient A or to Patient B.*

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Before Covid-19, many states had formulated guidelines for hospitals to follow if they were faced with a shortage of ventilators. It was those guidelines that got the M.I.T. economist Parag Pathak interested in the subject.

> *PATHAK: So most of the ventilator protocols we've come across are based on a points system where, medical ethicists and different stakeholders — doctors, legal scholars — basically take ethical principles and map them to numbers.*

For instance:

> *PATHAK: So there is a thing called a SOFA score, a SOFA score stands for the sequential organ failure assessment. And if your organs are more likely to fail, then you get a higher score. If it's less likely to fail, you get a lower score. So they take that, and they sum it up with another ethical criteria, which is we want to save the most number of years of life, not the most number of lives, but the number of years of lives. And there again, they take categories like, do you have a lot of comorbidities, or do you have few comorbidities? Assign a number. And when all is said and done, they just sum everything up and whoever's got the lowest score gets the ventilator first.*

This is a pretty standard way of prioritizing scarce medical resources — like organs available for transplant.

> *HAN: I mean, one thing I do do is lung transplant.*

MeiLan Han again, from the University of Michigan.

> *HAN: So I'm very familiar with the allocation systems for lung transplants. And they used to be based on how long you'd been on the list. And there was no prioritization of persons. But they realized then that means that the least-sick patients are all getting transplants because they're the only ones living long enough to get a transplant. So they changed that system to it being risk-based on your diagnosis, but then they added to it the patient's numbers, this massive calculation and the patient gets* ***a score****.*

How does this kind of calculation work for ventilators? We asked Pathak to walk us through the New York state guidelines, which were written in 2015.

> *PATHAK: So the highest-priority patients are those who are most likely to recover with a ventilator. They call those patients red. Next come the patients who are very sick and whose prognosis is a bit uncertain. So their likelihood of survival with a ventilator is in the intermediate range. So they're yellow. Then come blue patients. Those are patients who have a low likelihood of survival with ventilators. And finally, you have green patients. These are— green means go. These are patients who don't need ventilator support. So even if we had a ventilator, we wouldn't give those patients a ventilator.*

This priority-point system is similar to what most states recommend.

> *PATHAK: Now, where states can differ is what are the ethical principles that they entertain. And so some of the principles are things like saving lives or saving life years.*

Again, that's the notion of "quality-adjusted life years" that we mentioned earlier.

> *PATHAK: Other principles include reciprocity — so, someone who has put themselves at risk should get priority.*

That might include ambulance and fire-department and grocery workers as well as doctors, nurses, and other frontline healthcare workers.

> *PATHAK: There's also a concept of instrumental value, which is, if we don't have enough members of society of this particular type — say, doctors or respiratory therapists — we're in trouble. So they need to be prioritized.*
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> *DUBNER: Meaning they are the instrument — a doctor in this case, would be the instrument — that would create value down the line. Is that the correct interpretation of that phrase?*
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> *PATHAK: That's absolutely right. So there is just direct benefit — instrumental value, they call it — for having enough medical personnel, because if we didn't, then the crisis is just going to get worse.*

So you could see how a given state might consider the reciprocity idea and the instrumental-valuation idea and conclude that doctors and nurses should be given priority ranking if they get sick and need a ventilator. And that's exactly what some states have done. Michigan, for instance, where MeiLan Han practices medicine. But other states, as Pathak found, don't prioritize healthcare workers — including New York State.

> *PATHAK: So if I compare New York to Michigan— in Michigan, they say we want to prioritize essential personnel. And, they give this rationale based on reciprocity. They're taking on a high risk saving others. We've seen with Covid-19, a large fraction of those who got sick are actually these frontline healthcare workers. Minnesota, on the other hand, they've said, like New York, we should not treat frontline health workers any differently than any other patient.*
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> *DUBNER: And how many states do prioritize essential personnel?*
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> *PATHAK: We don't know the answer to that. So Michigan is a state that does, Massachusetts just released their standard yesterday.*
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> *DUBNER: And?*
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> *PATHAK: So they have the same priority point system. The two ethical criteria they have are saving the most lives and saving the most life years. And then they have a footnote or a paragraph below their table saying: "And we think that essential personnel should get heightened priority."*
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> *And it's a bit interesting because this table is very concrete and mathematical; it's taking these debates that the great philosophers have had and putting them onto a numeric scale. And then, there's this comment, "Oh yeah, and by the way, these guys should get heightened priority." Without*

> *explaining, does that mean they're at the front of the line or are they at the end of the line?*
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> *DUBNER: So it's math, math, math, math — and then, do what you think makes sense.*
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> *PATHAK: Yes.*
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> *DUBNER: And that strikes you as woefully inadequate, it sounds like?*
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> *PATHAK: Well, I mean, what's the point of specifying your values in this super-concrete way and then saying, "It's inadequate; we need to protect our frontline workers?"*

We should note we interviewed Pathak on Friday, April 10th; by Monday the 13th, doctors in Massachusetts were **pushing back** against the state's murky ruling, saying they should be given priority access to ventilators if needed. In any case, some states have decided to give doctors and nurses priority, while others have decided not to. I asked Pathak to play the role of disinterested scholar, and explain the logic behind each position. First: states like New York and Minnesota, where healthcare workers don't get priority.

> *PATHAK: So, I'm not an ethicist, but I can try to guess what the ethicists were saying. At core, their principle is a nondiscrimination idea. So, everyone should be treated equally. That's our collective values as a society. And if we prioritize someone based on their occupation, there's two issues. One is, why one occupation versus the other? So if I say frontline healthcare workers are taking on greater risks, we could also say that there are certain types of jobs that are more valuable to society that should be prioritized as well.*
>
> *Second thing is actually defining what a frontline health worker is. So is that a respiratory therapist? Is that an E.R. doc? What about a dermatologist? Do they count? And it's possible that category gets very large. What they're worried about is that the key workers would use all of the supply up. And that's going to deprive all of the other groups — people like you and me, Stephen — from getting access.*
>
> *DUBNER: And now let's hear you argue, let's say the Michigan side. What are the good reasons why healthcare workers should be prioritized?*
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> *PATHAK: Healthcare workers are heroes in this situation. They're putting their lives on the line. If you don't prioritize them, you could create some problems. Things like sick-outs or absenteeism. If I'm putting my life on the line and I could get exposed to Covid-19 trying to help someone else, maybe I decide not to show up. Or another thing could be, ethical dilemmas that healthcare workers themselves face. If they have to decide, should I give the ventilator to my colleague, who is a healthcare worker or another patient who's not, what do I do? So rather than force them to make those tradeoffs, we should prioritize healthcare workers first.*

So that's Pathak, playing the disinterested observer. What does Zeke Emanuel, the medical ethicist, think of the New York position versus the Michigan position?

> *EMANUEL: I think New York is wrong and Michigan's right.*

Emanuel and several co-authors recently made their position clear in a *New England Journal of Medicine* **article**.

> *EMANUEL: I think the logic is pretty simple and pretty widely endorsed, in the sense that in an emergency like a pandemic, where the health system is*

> *working flat-out to care for people, you want the healthcare providers who are providing that care to get the first treatment and keep them alive because they can save additional people. So one phrase that has been used is: they're force multipliers. One doctor, one nurse, one respiratory therapist, can care for many other potential patients. And so you want to save them first.*

Here's what Parag Pathak came to think about the states like New York that don't prioritize healthcare workers.

> *PATHAK: You know, my feeling about this, actually, Stephen, is I think most of these plans would like to prioritize frontline workers. They just don't know how to.*

And so Pathak and three fellow economists set out to help. They applied some of the principles of market design that have proven helpful in allocating kidneys for donation, in matching medical residents to hospitals, in distributing visas to immigrant workers. They quickly wrote an academic paper; it's called "**Triage Protocol Design for Ventilator Rationing in a Pandemic: Integrating Multiple Ethical Values Through Reserves**." The key word there: reserves.

> *PATHAK: Our proposal here is to think about an enhanced priority system where you take the ventilators and you split them into categories, or what we call reserves, where a fraction of reserves can have one priority order. The remaining ventilators can use another priority order.*

Imagine, for instance, we're talking about one hospital:

> *PATHAK: Let's say you have a 150-bed hospital and they have 20 ventilators. Our proposal is the following: Take the 20 ventilators, put them into two categories. Five of them are going to be ventilators that are going to prioritize essential personnel. Fifteen of the ventilators are just going to take the ethical principles of saving the most lives and the most number of life-years. We have these two groups. 48 hours in, there's 20 patients on ventilators. Imagine we have 30 patients show up who are frontline medical workers who need a ventilator. And there are an additional 60 patients who are not frontline medical personnel. What we need to do is take the 30 doctors or respiratory therapists or nurses who are on the frontline and try to allocate them a ventilator that's reserved for their group.*
>
> *DUBNER: Let's back up for a second. You said the 15 ventilators from the general pool are being used and that the five from the reserve pool are also being used. Are we to assume that all five of those reserve ventilators are being used by frontline medical personnel?*
>
> *PATHAK: It need not be, Stephen, actually. Suppose only three essential personnel had showed up. So then the remaining two would go to the general community.*
>
> *DUBNER: Let's say I'm a doctor that comes in, and I'm qualified for the reserve pool of ventilators. And there are two people on those five ventilators that are reserved for the reserve pool who are not from the reserve pool. They're from the general population. What happens? Do they need to get booted off their ventilator to accommodate me?*
>
> *PATHAK: That could be possible. We would potentially boot them off, since the New York standard actually talks a bit about moving people off of ventilators. That's typically done when someone's status changes. So if two of those people, if their SOFA score deteriorates, then one of the ventilators becomes free, and that would be the case in which you would potentially be booted off. It could be possible that the patient who would get displaced by*

the frontline medical worker would then actually qualify for the general pool, in which case they wouldn't need to be booted off. But what they would do is displace a general pool person who maybe has deteriorated and frees up a general pool ventilator. So key principle number one: no ventilators unused.

Key principle number two: the categories can overlap. So a frontline medical personnel, he could qualify for the first bite at the apple or he could qualify for the general pool, right? So his priority may be high enough that he gets a general-pool ventilator. Just having two separate priorities — or three or however many you wish — for different categories of ventilators, partitioning all ventilators into these groups and using a different priority order for those ventilators.

DUBNER: Might I not say, well, let's talk about instrumental value on a much larger canvas. So there's one doctor who might be able to treat over the course of the next month, I don't know, two, three, five hundred people. But what about a cancer researcher whose work might affect millions of people? What about an entrepreneur whose inventions might affect billions of people? So I understand why it resonates on an obvious dimension, why healthcare workers should be given priority. I'm not disputing that. But doesn't it feel like a fairly slippery slope? And if so, can you persuade me that you're not starting us on this slope primarily because you are married to a doctor?

PATHAK: Oh, sure. Let me give you another instrumental category that I think is important, and that is patients who sign up for a clinical trial on a Covid treatment. So we need patients to do that if we're ever going to find a treatment for this. If we don't have patients who do this, then the pandemic might last a longer amount of time. So they should also have some kind of consideration. You could call that a Good Samaritan category.

I would not say, however, that all of the instrumental value cases should trump these other considerations, because that's what I'm worried about. I mean, I don't think we can say that the person who's delivering groceries to folks' houses or running the subway system or the bus system — they're also keeping society going. So you're absolutely right. There is a slippery slope. So that's exactly the reason why we should not have a bang-bang is what we say in economics, a zero-one-type solution. We should have some set-aside that respects instrumental value or reciprocity, and some set-aside that has nondiscrimination.

I think the main reason our proposal improves the current situation is we can accommodate frontline personnel and we can also accommodate nondiscrimination. What we offer is a midpoint. So there's really no right answer here, right? It's about equity. It's about distributive justice. It's about what's the appropriate normative standard that we want to have here.

DUBNER: Now what about a flip side? What about a stick instead of a carrot? Should people who get caught, violating social distancing standards get demerits so that they don't have the right to a ventilator?

PATHAK: You know, that's a possibility, Stephen. I think there's going to be a lot of implementation challenges there. I will say, however, I think a lot of frontline medical personnel are annoyed when they see people not following the guidelines. So I could see some sentiment in favor of that, but that's a tricky one.

Pathak and his co-authors have already had one fruitful conversation with a bioethicist who was involved in setting up the Massachusetts standard for prioritizing ventilators. They plainly hope to influence the general conversation. To that end, it may be helpful to point to some other scenarios that use a reserve system.

PATHAK: So one reserve system that we studied recently is the H-1B immigration visa system. So H-1B visas are visas for highly skilled employees.

> *Tayfun SONMEZ: This year, H-1B visas are allocated in the following way.*

That's **Tayfun Sonmez**, one of Pathak's co-authors.

> *SONMEZ: There are 65,000 H-1B visas which are open to all qualified candidates, and there are 20,000 additional visas which are exclusively reserved for holders of advanced degrees from American universities.*
>
> *PATHAK: So it's a situation where someone who's got an advanced degree can qualify for more than one type of slot.*
>
> *SONMEZ: Advanced degree holders correspond to essential personnel in a way, because they are the ones who have these reserves.*

But there's one crucial difference between the H-1B visa reserves and the medical-personnel reserves the economists propose in their new paper.

> *SONMEZ: In the paper, we distinguish between two cases: hard caps, soft caps. So the ventilator application is what we refer to as a soft cap. So preferential treatment is given, but otherwise everybody's eligible for all units, whereas H-1B visa application is an example of a hard cap.*

A hard cap because members of the general population do not have access to the reserve slots.

> *SONMEZ: Actually, we are now talking to doctors, medical ethicists, lawyers, and they are very much interested in this idea, but they are a little bit worried about the "reserve" terminology. The phrase "reserve" might give people the wrong idea. These are soft reserves, no unit is ever left unused.*
>
> *DUBNER: So as we speak, there's some evidence that the Covid-19 curve is flattening in New York State, which has been the epicenter. So let's say, God willing, this trend continues and repeats itself elsewhere in the U.S. and around the world. And let's say that ventilators will not be as scarce a resource as predicted. What kind of value will your model or idea still have?*
>
> *PATHAK: You know, we all hope that we don't need to ration, and we get out in front of this, the curve is flattened. But I think there is a ton of value here in thinking about what we as a society think about rationing and who's more deserving. So, as I read the documents that exist from 2015, I mean, you could have asked the same question back then. Why did they write those documents? There was no influenza pandemic in 2015. It was all anticipating the future. And if our documents say certain groups are excluded or there's no priority for people who take risks, I think that's a dangerous situation.*

You could also imagine that Covid-19 itself will present further rationing necessities.

> *EMANUEL: We're not going to be able to get back to "normal" until we have a vaccine, which is about 18 months from now.*

That again is Zeke Emanuel.

> *EMANUEL: There will doubtlessly be vaccine rationing, and maybe even therapeutic rationing, depending upon which therapeutics seem to be effective against Covid-19.*

Thinking about rationing is a form of preparation that is in short supply.

> *EMANUEL: We didn't prepare for, obviously, surge capacity. We didn't prepare for, how do we rapidly develop and distribute a test? We didn't prepare for the idea of contact-tracing and working with the tech companies to develop a robust system for tech-enabled contact tracing. Obviously, we didn't prepare for enough ventilators.*
>
> *HAN: We were woefully underprepared.*

MeiLan Han again:

> *HAN: It turns out our national stockpile was not adequate. It turns out that even, for instance, some of the equipment in the stockpile, the ventilators, were not working. And really we don't have a centralized system to get needed medical supplies and equipment distributed evenly across the country. And what we are now left with is each state fighting for itself. Each health system fighting for itself. Each healthcare worker fighting for their own personal protective equipment. And to me, it just seems such a waste and such a shame that a nation with the resources that we have can't figure out how to use and mobilize those resources in a crisis like this.*
>
> *PATHAK: Ventilators are really concrete, but the principles that we're articulating apply to any indivisible resource that's in short supply. So let's imagine we have a vaccine for Covid-19. There's still a question of who gets the vaccine. So we have a rationing problem yet again and we need to think carefully about who is going to get it and how it's going to be allocated.*

* * *

Freakonomics Radio is produced by Stitcher and Dubner Productions. This episode was produced by **Zack Lapinski**. Our staff also includes **Alison Craiglow**, **Greg Rippin**, **Matt Hickey**, **Daphne Chen**, **Harry Huggins**, and **Corinne Wallace**; our intern is **Isabel O'Brien**. We had help this week from **James Foster**. Our theme song is "Mr. Fortune," by the Hitchhikers; all the other music was composed by **Luis Guerra**. You can subscribe to *Freakonomics Radio* on **Apple Podcasts**, **Stitcher**, or **wherever you get your podcasts**.

Here's where you can learn more about the people and ideas in this episode:

SOURCES

- **Parag Pathak**, professor of economics at M.I.T.
- **Ezekiel Emanuel**, oncologist and bioethicist.
- **MeiLan Han,** M.D. and professor at the University of Michigan.
- **Tayfun Sonmez**, professor of economics at Boston College.

RESOURCES

- "**Triage Protocol Design for Ventilator Rationing in a Pandemic: Integrating Multiple Ethical Values through Reserves**," by Parag Pathak, Tayfun Sönmez, M. Utku Unver, and M. Bumin Yenmez (*National Bureau of Economic Research*, 2020).
- "**Is Protocol-Driven COVID-19 Ventilation Doing More Harm Than Good?**" by Sharon Worcester (*Medscape*, 2020).
- "**Fair Allocation of Scarce Medical Resources in the Time of Covid-19**," by Ezekiel J. Emanuel, Govind Persad, Ross Upshur, Beatriz Thome, Michael Parker, Aaron Glickman, Cathy Zhang, Connor Boyle, Maxwell Smith, and James P. Phillips (*The New England Journal of Medicine*, 2020).
- "**Ventilator Allocation Guidelines**" (*New York State Department of Health*, 2015).

EXTRAS

- *Making the Call*, by Dr. Zeke Emanuel and Dr. Jonathan Moreno.

TAGS: Covid-19, MeiLan Han, Parag Pathak, Stephen Dubner, Tayfun Sonmez, ventilator, Zack Lapinski, Zeke Emanuel

ALSO ON FREAKONOMICS

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Jim • 7 months ago • edited

Doctors make Q.A.L.Y decisions for ventilators. Political leaders are making the reverse assessment that every life should be saved. Nobody is talking directly about 33 million unemployed (so far) that are primarily saving the elderly. Every year 2.8 million Americans die. Of those 2.1 million (74%) are 65+, of which 96% die of health conditions i.e. not unintentional injuries, suicides, homicides or car crashes. https://www.cdc.gov/injury/... Based on April 22 data from NYC, 75% of the deaths from Covid-19 are 65+, 99% of which had underlying health conditions. https://www1.nyc.gov/assets... Are we spending $3-4 trillion to save mostly 65+ individuals that would have died of other health causes during the next 12 to 24 months. As a 65+ I worry about what kind of Q.A.L.Y are we leaving for our kids and grandkids. I'd love to hear what you and Levitt think about this along with some ethicists. And if my assertion is true that a large percentage of the deaths would have happened anyways.

2 • Reply • Share ›

Neil • 8 months ago

I'm a little disappointed this episode failed to mention the extremely high cost to replace a health care worker. Doctors need a 4 year degree, 4 years of medical school and then internships and residency which can last from 3 - 7 years [1]. Already some medical systems have graduated med students early to increase the supply of health care workers such as Italy [2] a month ago. Thus there are fewer future doctors in the pipeline. Additionally the pandemic will affect higher education, med schools and residency programs which was not explored by this podcast.

The point that health care workers save many more lives was barely mentioned and hardly investigated in depth. How much is the demand for more health care workers? How soon can a health care worker that needs to be ventilated return to work after recovery? How long will the pandemic last? Considering many governments are considering pulling medical workers from retirement [3] and doctors are flying to New York to help it's clear the demand is high. How long recovery takes is unclear but it appears to be taking weeks [4]. If the pandemic lasts a couple years as many predict [5]

then it is certainly worth it now.

We can always produce more ventilators but we can't create thousands of new doctors out of thin air to replace those that died because we didn't prioritize their safety.

Then all of those ventilators are useless if there is no one to intubate a patient, put a line in, and sedate a patient so they can use one and more will die.

Stephen please consider returning to this topic in a future episode. I think this episode will encourage thinking that will ultimately cause more harm than help. You can read the other comments to see that effect for yourself.

[1] https://study.com/requirements_to_become_a_doctor.html
[2] https://www.newsweek.com/italy-coronavirus-covid-19-medical-students-1492996
[3] https://abc7news.com/society/newsom-calls-for-all-healthcare-workers-to-help-during-covid-19-pandemic/6063210/
[4] https://www.nytimes.com/2020/04/13/opinion/coronavirus-recovery.html?action=click&module=Opinion&pgtype=Homepage
[5] https://www.wbur.org/commonhealth/2020/04/15/social-distancing-2022-coronavirus-research

2 ^ | v 1 • Reply • Share ›

Robert • 8 months ago

Nobody wants to talk about the elephant in the room.

When it comes to COVID-19, obesity is a very significant factor in a patient's outcome.

https://www.nytimes.com/202...

If we just put the obese on the bottom of the list for receiving a ventilator, we would have no shortage for right-weight people. This is completely fair and ethical. It costs nothing to be at a correct weight--just eat less--and obesity cuts across all races, income levels, and sexes.

1 ^ | v 1 • Reply • Share ›

Alison • 7 months ago

I'm not sure if this was mentioned already, but are there measures in place to protect patients who are from communities that may have comorbidities arising from various (systemic/socioeconomic/etc) reasons? While it does not seem ethical to deprioritize the patients with these kinds of comorbidities, I recognize that this doesn't necessarily mean we should be deprioritizing the patients with better metrics or somehow evaluating how much 'fault' a patient has for their comorbidities, which sounds just as unethical.

^ | v • Reply • Share ›

J • 7 months ago

As always, a fascinating and well researched podcast. Simply a comment on the widely accepted statement that race should not play a role in determining aid. You mentioned certain parts of the world that don't readily accept this. Another is South Africa - government aid is being distributed based on race. Where civil society has thus attempted to collect funds to help the many desperately suffering and denied any relief, the government is attempting to regulate these funds as well. It is deeply tragic that South Africa's legacy of racial discrimination, which one would hope is now overcome, is continuing, especially during a time of such unprecedented crisis.

^ | v • Reply • Share ›

tkejlboom • 7 months ago

lol, California had refurbish the ventilators from the national stockpile to return them to working order. Are economists factoring in that any devices in a stockpile are possible and perhaps even likely to not be working?

^ | v • Reply • Share ›

Cycling Tiger (3 tardigrades i • 7 months ago

The last point from Pathak doesn't quite hold true. The rationing issue with the vaccine is about flow and volume with no appetite for the ongoing asset position of owning ventilators. The ideal number of vaccines is one per person, the ideal number of ventilators is the lowest possible that will still prevent the most deaths.

When vaccines do become available, the deployment pattern can be designed in a way that can creates an artificial herd immunity that will minimise the epidemiological risks and transmission rates. With the luxury of time, that it a piece of modelling that should

be underway now.

Reply • Share ›

dragoncrystal24 • 8 months ago

I absolutely love the sound design of your podcasts. I tend to binge many episodes of your podcast in a row while I'm pulling late nights (or all-nighters) for architecture school, so all the little sounds and chimes of each episode remind me that I'm in for some good listening while I work.

Reply • Share ›

Kristin • 8 months ago

I'd like to hear more discussion about rationing based upon disqualifications. There was a short segment about people who don't follow social distancing rules; what about the 50-year old who is an alcoholic or who has been smoking for 35 years and is overweight? Why should that 50 year old get priority over a 65-year old who has had a healthy life style their entire life?

Reply • Share ›

PaulK2 • 8 months ago

The entire Roman upper class was poisoned to death by lead bottomed cookware.

Ventilators are too powerful, and they cause lung damage rather than simply getting air to the patient.

In the 1918 Spanish Flu pandemic, sitting people up 24 hours a day was found to often keep people alive until their bodies could develop the antibodies to fight off the virus.

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Cedric Gommes • 8 months ago

In normal times too, many people do not get the medical care they need. On a fundamental level, the situation is therefore not different. It would be interesting to see the same type of rationale - who to cure, based on what criterion - applied to determine who gets a decent health-care insurance.

I assume the rationale is that money is a measure of somebody's social utility. But then, it seems to me that the present situation is also shedding a new light on everyone's real social utility.

Reply • Share ›

Dr Jon NH • 7 months ago

The issue of ventilator rationing seems to be a largely academic exercise so I suggest you re-visit it but with from a perspective of better information on two issues:

1) Patients with problems in addition to Covid have between a 1 in 3 and a 1 in 5 chance of surviving

2) Patients who do survive are severely handicapped for what is now an undetermined recovery time with unknown capacity for recovery.

Any rationale for priority for health workers is based only on ethical issues. Their value after ventilation as health care workers is minimal at best.

The Podcast treated ventilation as a cure, it rarely is.

If the you use the ration principle of likelihood of survival, i.e. getting off the ventilator and resuming breathing the number required falls by somewhere between a factor of 3 and 5.

The real issue is whether we should be ventilating Covid patients at all if resources get too stretched.

1 • Reply • Share ›

Dr Jon NH • 7 months ago

The ventilator shortage seems to be largely an academic problem and I suggest needs discussion from a more realistic basis.

The discussion in the and whether they will improve fro being podcast assumed that patients who got the ventilator were likely to survive and the rationale to priority for medical workers as force multi;pliers assumes that after ventilation they are capable of working as before. They may be able to work, but would be very unlikely to be able to do

any heavy lifting.

Two factors in ventilator usage were not considered in rationing.
1) Most people who get the ventilators die anyway
2) People who do survive rarely if ever return to being able to work which requires even a long walk.

For a patient with additional conditions a ventilator is a "Hail Mary pass" First priority should be the patients most likely to survive. That alone seems to be able to reduce the demand by a factor of between 3 and 5. You do not have to get into the issues of years of productive life, which lack inclusion of the costs of rehabilitation of survivors. It is simple matter of using resources for people likely to survive.

▲ | ▼ 1 • Reply • Share ›

Jim Becker • 8 months ago

After listening to this podcast and others about the Coronavirus, I'm not sure that I can agree with giving front line health care extra extra consideration in allocating ventilators or any other scarce medical resource. One of the things that I understand that anyone who needs a ventilator will have a long and slow recovery. If that is the case, then giving them that extra benefit doesn't fit because there is no extra benefit to society during the pandemic, because these workers may not be able to come back to work during the pandemic. In that case why give them extra benefit. The only thing that makes sense is a thank you for your service.

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Harriska2 ➦ Jim Becker • 8 months ago

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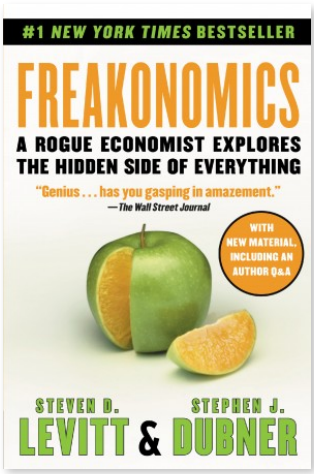

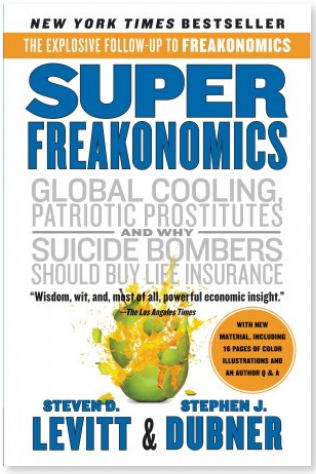

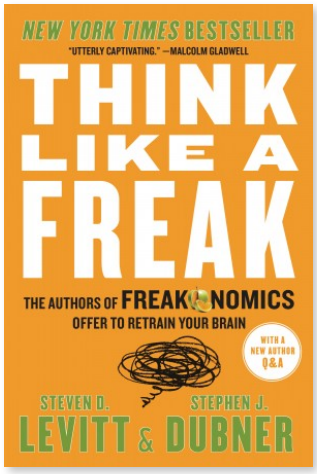

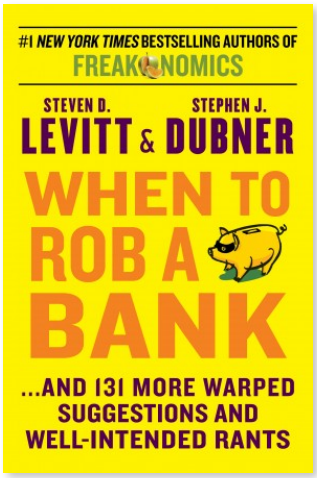

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