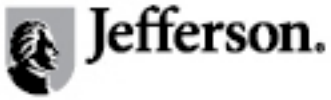



3-2020

# Pandemic lockdown must fail: Save lives without crippling the economy

Larry Hirschhorn, PhD

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## Introduction

The Harvard School of Public Health has released an extremely important study on the coronavirus pandemic in the U.S.[1] I will refer to this study as "HS" in the rest of this paper. It is the result of simulating, at a county-by-county level, the beds we will need to treat all the patients who are hospitalized. **The headline: In six months, 99 million people will be infected and 21 million people will need 1.3 million beds.** This is the fundamental challenge we face. As the infection spreads and people get sick, we risk overwhelming our healthcare system, threatening patients and healthcare workers alike. Of course, while beds are necessary they are not sufficient. We need more healthcare workers and more ventilators. But without beds we are nowhere.

This is, after all, why we are practicing social distancing. We want to slow the down the infection's spread, to "flatten the curve" in the current parlance. But as everyone acknowledges, if social distancing—with its associated lockdowns—succeeds, we risk bankrupting many small businesses that are the backbone of our economy and employ 34% of the workforce. Our living standards will be compromised. Failure follows success.

In the following working paper, I want to make a plea for what I am calling a "reverse quarantine"—quarantining people who are over 65 (who number 52 million), *before* they get sick. We need to complement this policy with federally funded and locally organized efforts to support seniors in place, drawing on the wellsprings of American pragmatism, the capacity to respond in emergencies, American volunteerism, and neighbor-to-neighbor assistance. We can't turn quarantine into imprisonment. We must work as hard as we can to create a psychological sense of community at a moment when, paradoxically, social distancing is driving us apart. This may be utopian, but in the presence of disaster, hope can be motivating.

Why do this? If the elderly stay in place this will both reduce deaths, as seniors are the most vulnerable, and reduce the number of people who can transmit the infection. We reduce the total burden on the health system. With the burden eased, we can let the virus spread more quickly, knowing that we have the hospital beds and equipment to help them. This would shorten the economic downturn leading to fewer business bankruptcies. After all, within the year, everyone who can be infected will be. The challenge that bedevils and threatens us, should we find no resolution, is to match pacing with the requisite supply of beds. In this note I provide the data and its analysis to back up this argument, to the best of my ability. I hope the latter was up to the task.

This note is organized into six sections. In the first section, I introduce the HS and reproduce within the limits of my Excel modeling tools, their projection. In the second, I argue that social distancing will in all likelihood fail. We will have few of its benefits and most of its costs. In the third, I draw on a long theoretical tradition that connects long bouts of unemployment to deaths. I suggest that if social distancing provokes a long economic downturn, between 28,000 and 68,000 people will die in the years following the crisis. In the fourth, I briefly describe the Chinese and South Korean strategies for coping with the crisis. I argue that their successes are based on their distinctive culture and politics. We can't use them here. In the fifth, I use a range of data sources, starting with HS, to estimate how many beds are "released" by quarantining seniors. I estimate that we can reduce the number of new beds we must build or re-purpose by over a million if we quarantine the elderly, decrease the length of stay in non-ICU

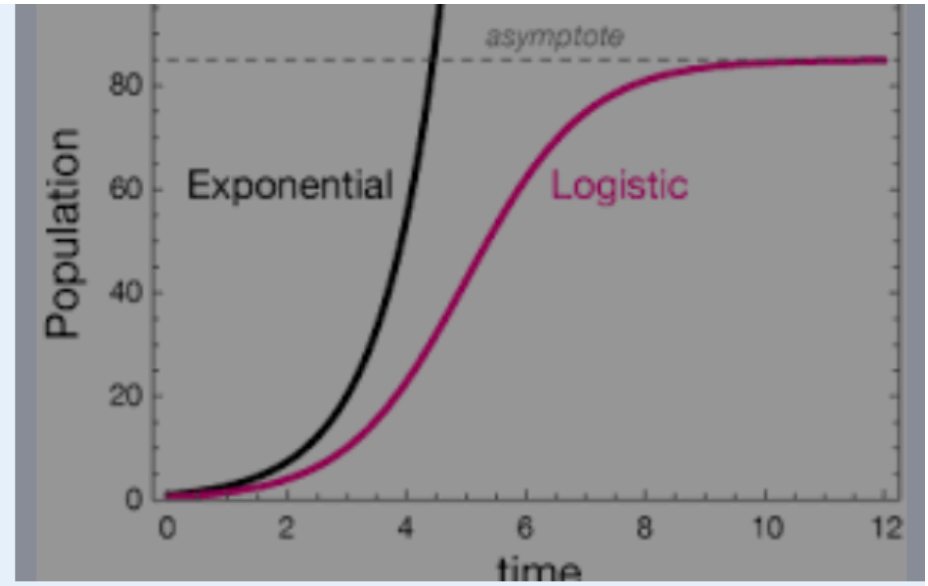
[1] https://docs.google.com/spreadsheets/d/1xAyBFTrlxSsTKQS7IDyr_Ah4JLBYj6_HX6ijKdm4fAY/edit#gid=0

beds, and repurpose current hospital beds. This may be an overestimate—a best case scenario—but I believe that the estimate is within an order of magnitude correct. In the sixth, I outline the rudiments of an American plan for tackling the crisis acknowledging that it may be still-born, with so little time left. It combines a war-economy with local initiative. I end with a plea that we expand the discourse about the crisis beyond the language and frameworks of the public health discipline. We need the voices of engineers, business leaders, economists and project managers. If we ever needed a "systems view," it is now.

## I. The Harvard study

The bottom line of the Harvard report is as follows. In 120 days, 99 million people will have been infected with the virus and 21 million will need to be hospitalized. These numbers are based on their "mid-range" scenario in which 40% of the population is infected. I have not seen the whole report, just the data released to help with city and county planning. I assume that some version of what is called the "logistic growth curve" underlies it. It is the basic conceptual tool for modeling the spread of infections. Logistic growth, as the following diagram shows, consists of two phases, the first, the exponential phase, is one of rapid acceleration, the second is a phrase of deceleration or gradual flattening.

**Figure 1**




Logistic functions

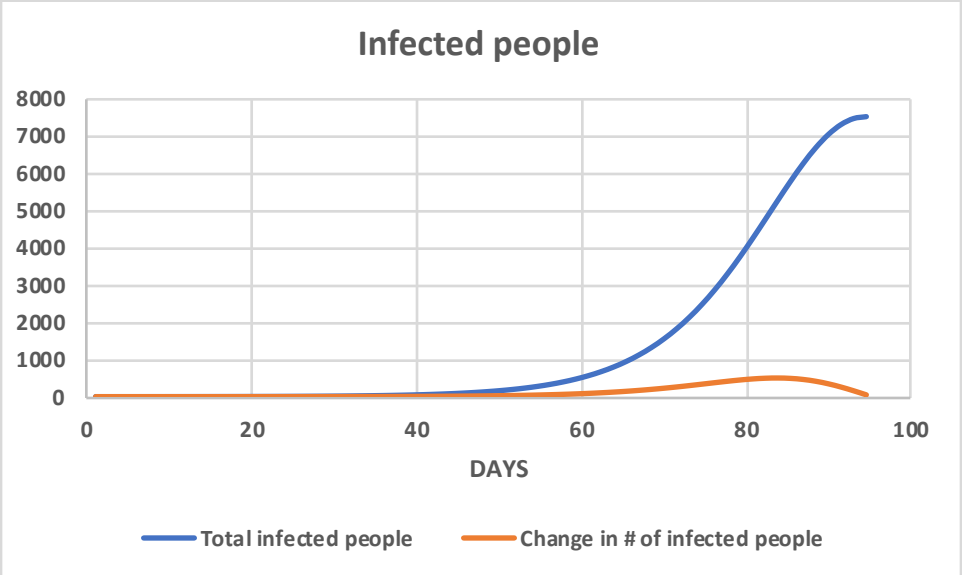
Why does the curve flatten? This happens because a process of exponential growth comes up against an absolute limit (for example, the number of people in a population who can possibly be infected). In addition, as infected people become immune, the number of people who can be infected declines, reducing the hosts the virus can attack. It stands to reason that as fewer uninfected people remain, the growth curve will flatten.

## My very rough approximation

I don't have access to the quality of simulation tools the HS analysts used to predict with precision the bed shortage on a county-by-county basis in the U.S. But I used an Excel model to create a rough approximation of the Harvard projection of infections.

The CDC reports—*as of this writing*, it changes daily—that there are about 4,000 people who have been infected. To approximate the HS results, I created a logistic curve whose exponential growth is about 20% every 1.5 days. The constraint that flattens the curve, is 40% of the U.S. population. I also assumed that after 14 days a previously infected person can no longer be a host, thus reducing the curve of acceleration by reducing the size of the "infectible" population. The result is a curve as show in Figure 1 above. I scaled it so that 1/10,000 is the same as 1. This simple simulation "produces" 75 million infections in 95 days. I don't the know the HS underlying parameters and formulas, but I will take my simple model as a rough approximation of it.

**Figure 2: Growth in number of Infected People**




## Logistic growth and social distancing

The current response to the looming crisis is to promote isolation and social distance. This seems sensible. After all, the less contact, the less infection. But the challenge is two-fold. First, when the population of potential hosts is very large, as is the case in the U.S., it takes a long time before the limits to growth kick in. Before that happens growth is exponential. Second, we should not confuse social distance at the micro level with social distance at the aggregate level. Consider why the Chinese succeeded. By locking down entire cities and restricting movements to the fullest between them, they created sealed off zones with much smaller populations. Under these conditions the virus infected a substantial proportion of the people in the sealed off zone in a limited amount of time and once the infection reached its limit—all the people who could be infected were—the virus had no more hosts. Each of us may practice rigorous social distancing. But if our locales are not sealed off from each other, small leaks from one zone to

another means that that the virus still has a host size equal to the U.S. population. Social distancing diminishes contact within a locale but it does not seal off one locale from another.

Perhaps this is why HS produced what it appears to me to be a pessimistic picture of the near term. As I noted, it predicts that the virus will infect 99 million infected in six months or 82% of its hosts. Since the growth is exponential, its growth will be slower in the first few months but then will "take off," a bit after the half-way mark. It is hard not to see this projection as a prediction that social distancing will have failed as a containment strategy. It has simply come too late.

## II. Why social distancing will fail

All of us may stand six feet from one another, but realistically, we cannot shut the economy down if we wish sustain a modicum of our current living conditions. Someone must deliver our food and gas, repair our cars and trucks, pick items in the warehouses, deliver the mail, install and repair our computing and networking equipment, construct hospitals facilities, produce ventilators, and manage everyone's beloved Zoom network. The promise that the federal government will give people money is an empty one if there is nothing to buy. In fact, this policy combined with a downturn will lead to inflation. We have no choice. Millions of people must work. Unfortunately, these people will remain "vectors" for the virus, however rigorous any of us is in our daily habits of hand-washing.

Consider some numbers. While much attention has been focused on people working from home, roughly 75 million people, proverbially called blue collar workers, work outside the home.

**Table 1: Blue Collar Occupations [2] (1000's)**
*Out of home Occupations: Non-management occupations*

| | |
|---|---|
| Construction and extraction | 8,325 |
| Installation, maintenance, and repair | 4,862 |
| Production, transportation, and material moving | 18,628 |
| Transportation and material moving | 10,063 |
| Protective services | 3,128 |
| Building and grounds cleaning and maintenance | 5,746 |
| Farming, fishing, and forestry | 1,156 |
| Installation, maintenance, and repair | 4,862 |
| Production | 8,565 |
| Transportation and material moving | 10,063 |
| **Total** | **75,398** |

This is 38% of the total adult population of the U.S. In addition, there are 64 million managerial and professional workers.

[2] https://www.bls.gov/cps/cpsaat18b.htm

Now, imagine that 15% all production workers were idled, a great not calamitous recession and for every 10 production workers let go, a corresponding 3 professionals/managers are let go. In addition imagine that ½ of the employed professionals work from home.

Consider as well another issue. The people who are most frightened by the pandemic are the old and infirm. Younger people are less frightened since they are much less likely to have weakened immune systems. They will not be able to gather in large numbers in restaurants, but they will continue to stay on the street, particularly as the weather improves, to shop in supermarkets, to visit hospitals and doctor's officers as needed, to ride buses and trains, to stay at hotels, etc.

If "old" is over 65, then the "non-old" group is about ¾ of the workforce. In addition, they are the ones who are more likely to be asymptomatic. Feeling healthy, they are less likely to be cautious, particularly as the protocols for social distancing become wearing and the stress of idleness, marital discord, the press of unsupervised children, and economic anxiety increases. with others can we really expect this policy to be successful?

These assumption are represented in this table.

**Table 2: What happens when workers are unemployed: Some assumptions**

| | |
|---|---|
| Pofessional workers in the workforce | 64 |
| Production workers in the work force | 75 |
| Unemployment rate of production workers | 0.15 |
| Unemployment rate of professional workers | 0.045 |
| % of workers less than 65 years | 0.75 |
| %o of employed professionals who work at home | 0.5 |
| % of people at home who don't practice social distance | 0.5 |

We get the following results:

**Table 2A. Production worker unemployment rate: 15%**

| | Prof | Production | |
|---|---|---|---|
| Total in work place | 29 | 64 | |
| At home | 35 | 11 | |
| Don't practice SD while at home | 13 | 4 | |
| Potential vectors for the virus | **42** | **68** | **110** |

We get 110 million people who are vectors for the virus, a third of the work force. We might suppose that we could reduce the number of "vectors" by drastically cutting back on jobs. Consider an unemployment rate for production workers of 50%, a calamitous level more than twice the rate of the Great Depression. We get the following:

**Table 2B: Production workers unemployment rate of 50%**

| | | | |
|---|---|---|---|
| Total in work place | 22 | 38 | |
| At home | 42 | 38 | |
| Don't practice SD while at home | 16 | 14 | |
| **Potential vectors for the virus** | **38** | **52** | **90** |

Even though the unemployment rate has increased more than three-fold, the number of people who are potential vectors for the virus fall by only 18%. This is because we are just shifting people from the workplace to the home and if younger people are not rigorous in practicing social distance they can spread the infection whether at home or at work.

There is a more insidious consequence of social distancing, but it will be soon become apparent. We are unraveling the supply chain. This is dangerous when, at the same time, we anticipate mobilizing people, money, and resources to meet the challenge of building hospital capacity. What happens when people responsible for sourcing supplies and skilled workers come up short?

## III. The health costs of economic distress

We also have to consider the impact of economic distress on health. The virus kills but so can severe economic downturns. Two studies are relevant.[3] The first, a classic in the field, and based on a review of experiences in nine western countries, found that a 1% increase in unemployment led to 6,000 extra deaths in the population in a particular year. Of course, "frictional" unemployment, when workers move between jobs need not be distressing. What counts is the length of the unemployment experience. The average duration of employment in the U.S. from 1990 to the present is about 21 weeks or five months. Social distancing will most likely induce a recession, and it could be severe because, as I have already noted, many businesses, particular the smaller ones, will face a cash crunch and likely bankruptcy. Recessions on average last 11 months, longer than the average bout of unemployment.

The following table shows the relationship between downturns and unemployment.

**Table 4: Recessions and Unemployment[4]**

| | Contraction in GDP | Unemployment rate |
|---|---|---|
| 1954 | -0.60% | 5.0% |
| 1974 | -0.50% | 7.2% |
| 1975 | -0.20% | 8.2% |
| 1991 | -0.10% | 7.3% |
| 2008 | -0.10% | 7.3% |
| 2009 | -2.50% | 9.9% |

[3] R L Jin, C P Shah, and T J Svoboda The impact of unemployment on health: a review of the evidence, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1487417/

[4] https://www.thebalance.com/unemployment-rate-by-year-3305506

The rate of unemployment just before the coronavirus crisis was 3.6% If the recession is as severe as that which followed the 2008 crash, a 9.9 % unemployment, the contraction should produce excess mortality of 6000 x (9.9 - 6.3) = or 37,000 "extra" deaths, just within this year. If the recession were more extreme, 15% employment and it lasted for at least a year, we would "create" 6,000 x (15 - 3.6) or 68,400 deaths.

Social distancing may compound this empirical link between health and economic hard times. In normal times, when despair is shared, people help each other thus mitigating their sense of isolation. The shared despair paradoxically can create social cohesion. This experience protects health just as unemployment undermines it. For example, in the Great Depression of the 1930s, workers and farmers found agency and cohesion in their struggle to form unions and in their common fates as they migrated West. Paradoxically, one result of social distancing is social isolation and the fear and suspicion that other people are careless in their regard for one's own health, or worse, that they are predators.

These estimates are based on correlating yearly data. We must take account of the "long tail" consequences of a major recession or depression. Some detailed clinical studies of particular populations allow us to take account of this longer tail in terms of health outcomes. For example, one meta-analysis reports[5] on two studies of the "standard mortality rate" of unemployed men in the U.K. The Standard Mortality Rate (SMR) is the ratio of the observed death rate of subjects in a particular study relative to the death rate of similar group in the population. So, a rate of 121 represents a 21% increase over the expected rate.

In one study of unemployed men, they suffered a 21% increase mortality relative to their peers and in a second study, a 47% increase.

**Table 5: Standard Mortality**

| Age group | Number of Men in Study | Standard Mortality Rate |
|---|---|---|
| 15-64 | 5861 | 121 |
| 15-64 | 14675 | 147 |

We can use these results to calculate the impact of long-term unemployment on the mortality of U.S. workers. To do this, consider first the following table. It presents the expected deaths per 100,000 men of different ages and the percent that each age group is of the total labor force. I used this data to create a weighted average for workers aged 16 to 64 of 403 deaths per 100,000 in a given year.

[5] Op cit, RL Jin

**Table 6: Deaths per/100,0006**

| Age groups (men) | Deaths per 100,000 | % of labor force |
|---|---|---|
| 15-19 | 72.7 | 3% |
| 20-24 | 137.9 | 10% |
| 25-34 | 154.6 | 24% |
| 35-44 | 232 | 23% |
| 45-54 | 422 | 22% |
| 55-64 | 1124 | 18% |
| | Weighted average deaths | 403 |

This number became my expected death for workers in the labor force and I could then apply the SMRs to calculate the extra deaths.

**Table 7: Extra Deaths due to Unemployment**

| Age group | Number of Men in Study | Standard Morality Rate | Extra deaths per 100,000 |
|---|---|---|---|
| 15-64 | 5861 | 121 | 85 |
| 15-64 | 14675 | 147 | 189 |
| | | Average | 137 |

So we can expect that there will be an extra 137 deaths per 100,000 people should the economic contraction result in a significant recession. There are 78 million men in the labor force from the ages of 16 to 64. If we have a contraction with 15% unemployment, then the number of expected deaths would be .15 x (78 million/100,000) x 137 = 16,029 extra deaths Note that this only applies to men. If women were ¾ as likely to die as men, we would have extra deaths of 28,050 deaths

Of course, these are admittedly rough calculations, but I think they point to order of magnitude estimates that warrant serious consideration. We are looking at somewhere between an extra 28,000 to 68,000 deaths should the current contraction and resulting recession prove severe. We must consider the mortality risks of a severe recession. They are likely to be substantial and they will be hidden, because they will have a longer tail than the deaths associated with the virus.

**Let's step back**. Here is my pessimistic scenario (as if there is not enough already). Without draconian measures that lock down regions and cities, the social distancing strategy will fail in about three to four months. Everyone will be on course to be infected. We will unravel the

[6] https://www.statista.com/statistics/241572/death-rate-by-age-and-sex-in-the-us/

supply chain we need to build the beds required to treat the sick and fend off deaths. The resulting economic depression and social distress will be demoralizing. People will have sacrificed living conditions and social connections for nothing. They will experience inflation, the first in the living memory of young adults.

Not enough beds, inflation, unemployment, a demoralized population and deaths the virus did not cause. Five horses of the apocalypse. This is a dangerous outcome.

## IV. Two extant strategies

The Chinese and the South Koreans provide us with two distinct strategies for responding to the crisis; regional lock downs, and mass testing combined with the surveillance. There is a third, which I envision as an American response: The reverse quarantine combined with a new "Manhattan project," the latter, a reference to the project established to build the atomic bomb in World War II. I will make an argument for this third alternative. It draws on American can-do culture and its volunteer ethos—if indeed we can draw on this reservoir of historical memory and experience. My proposal may be too late in the coming months and perhaps is decidedly utopian in character. But if I am to remain true to my sense of urgency and contribute to the necessary discussion we must have, I feel I have no choice but to offer them.

### Lock down

The Chinese have clearly been successful with a lock down strategy, increasing the doubling time of deaths to 34 days, the days it takes for deaths to double, though there has been some slippage since earlier in the week. At the time of this writing, their doubling time was 34, days and if my notes are correct, it was once 39. The virus is down but it may not be out. By all accounts, they have achieved their success through draconian measures that cannot be reproduced elsewhere. As one reporter notes,[7] "Thirteen cities, containing more than 60 million people have been locked down. Homes have become prisons; life has stopped China has the ability to impose these measures better than anyone else on the planet," As another observer noted, "There's no other place that could do what China did to that magnitude and sustain it."[8] As I noted, lockdowns succeed for one simple reason: they deprive the virus of the large host population it needs to spread itself widely. But this means that there can be no leakage between locales. Any leakage—a truck driver, a salesperson—creates a vector for carrying the virus from one locale to another.

### Mass testing and surveillance

The South Koreans have succeeded with mass testing and surveillance, driving up their doubling days of deaths to 12, though this still represents roughly, a 6% growth rate per day. As of March 17, they conducted a total of 274,000 tests and are able to test 20,000 per day. They have 50 drive in centers for testing. Testing is matched with surveillance. The government mandates that people install GPS tracking devices on their phones and, "Public government reports detail the whereabouts of every single confirmed patient—down to which theater seat

[7] https://www.wired.co.uk/article/coronavirus-uk-response-china
[8] https://www.wired.co.uk/article/coronavirus-uk-response-china

they sat in, which plastic surgery clinic they visited and even where they got their lingerie. The health and the National Police Agency share the "location information of patients and of persons likely to be infected." [9] With this tracking system the authorities can rapidly "contact-trace" hundreds of thousands of its own citizens to curb the outbreak. In addition, as a result of new amendments to current laws and regulations, "The government can criminally prosecute suspected patients who refuse to get tested for the virus with a fine of up to 3,000,000 KRW (~$3,000). The amendment also significantly increases the potential penalty for breaking quarantine to up to one year of imprisonment or a fine of 10,000,000 KRW (about $10,000) for the offense." [10]

The South Korean experience highlights how testing and surveillance must be combined. Testing people helps individuals make informed and thoughtful decisions if they choose to do so, for example, to protect others. But without such native consideration, the impact of testing on containing the virus is limited. It does not by itself prevent the infection's spread. It is very important for protecting healthcare workers who can screen the patients they care for, but it won't necessarily control the infection's spread

I understand that these are tintype descriptions. Much more can and will be written on the record of these countries' responses and results. But I highlight them to suggest that there should be a fit between a country's cultural makeup and the measures it uses to combat the virus. For example, the South Koreans in their effort, profit from several distinctive cultural features: their cultural cohesion and homogeneity, their familiarity and comfort with putting themselves on a quasi-war footing—a legacy of the existential threat from the North—the social discipline that propelled the country from poverty to wealth in two generations, and from their Confucian tradition that values loyalty.

It is also evident that the Chinese Communist Party's uncontested policer power has helped them fight the virus in their country. The party's cell structure in government, and increasingly in private companies—the shadow authority system that regulates and constrains apparent authority in all institutions—helps the party direct and coordinate the decisions and choices of local and regional governments and ministries.

**The hospital capacity problem project**

What option do we have in the U.S.? First, let's consider the scale of the problem. The presenting challenge, as every expert acknowledges, is that we do not have the hospital beds and the associated staff and equipment to care for the people who will be acutely ill. What is the size of the gap?

The HS projects a need for 1.3 million beds in the next six months to accommodate roughly 21 million patients. This means roughly that every bed can "turnover" 21/1.4 or roughly 15 patients in six months, or 2.5 patients per month. This means roughly a length of stay of .4 days of a month (1/2.5), or a bit less than two weeks.

[9] https://www.lawfareblog.com/lessons-america-how-south-korean-authorities-used-law-fight-coronavirus
[10] Ibid

The CDC reports11 that seniors (those older than 65), will account for 45% of hospitalizations, 53% of ICU admissions, and 80% of deaths associated with the virus. In addition, the HS projects that 21% of all admissions to the hospital will be to the ICU. We can use this data to construct the following table.

**Table 8: Admissions of 100 patients**

| | seniors | not seniors |
|---|---|---|
| ICU admits | 11 | 10 |
| Regular admits | 34 | 55 |

This table begins to give a sense of the resource load on the hospital system that seniors constitute. They are 45% of all admits and 52% of all ICU admits.

I can use this data to "reverse engineer" the HS projection, that, on average, a patient will spend a bit less than two weeks in the hospital. This number at first seems high but that is because it reflects both ICU and regular admissions. Patients in the ICU will stay longer than patients in acute care beds. The following table shows the results. (If the reader finds the concept of "fractional patients" bothersome, just multiply the patient and patient-day numbers by one-hundred, so that ".5" becomes "50" and "2" becomes "200.")

**Table 9: Patients and patient-days per month**

| | Number of Patients | Length of stay in months | Patient-days |
|---|---|---|---|
| ICU admits | 0.5 | 1.00 | 0.5 |
| Regular | 2.0 | 0.25 | 0.5 |
| Total patient | 2.5 | | 0.4 |

I calculated these numbers in the following way. We know from the HS that each bed turns over 15 patients in six months or 2.5 patients per month. This is equivalent to the idea of "inventory turns" in business, or the way a restaurant owner thinks of his tables- how many dinner parties does it turn over in an evening. Using the data from Table 10 this means that of these 2.5 patients, .5 are admitted to the ICU and the rest to regular beds. "Playing with the numbers," I found that if an ICU patient stays a month in the hospital and a regular patient stays a week this means arithmetically that the length of stay of the "average" patient will be .41 months, (.5+.5/2.5), which matches very closely, the HS data.

We just need a few more steps in the calculation. Using the percentages in Table 10 we find that:

[11] https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm?s_cid=mm6912e2_w

**Table 10: Old people admissions per month per bed**

| | |
|---|---|
| Total admits per bed per month | 2.5 |
| Senior/ICU | 0.28 |
| Senior/regular | 0.84 |

So we can now use Tables 8 and 9 to "subtract" the old people from the 2.5 patients per month load on a hospital bed. We can use the results to calculate the new average length of stay and patient load per bed.

**Table 11: Impact of withdrawing old people on patient days**

| | Number of Patients | Length of stay in months | Patient-days |
|---|---|---|---|
| ICU admits | 0.2 | 1.00 | 0.2 |
| Regular | 1.1 | 0.25 | 0.3 |
| Total patient | 1.4 | | 0.39 |

Patients have dropped from 2.5 patients per bed per month to 1.4 patients. If originally a bed was turning over 2.5 patients and is now turning over 1.4 patients, we need correspondingly 1.4/2.5 = 56% as many beds. The reason this drop is so large, more than half, is because seniors are slightly more than half of all admits and more than half of all ICU admits, the admissions that take up more bed-time. Since the HS projection is for 1.3 million beds, the number of beds saved comes to roughly (1-.56) x 1.3 million or 572,000 beds. This is a sizeable reduction in bed requirements.

Quarantining has two other important benefits. It reduces the demand for ICU beds by almost 40%, --.2/.5. This has a great impact on the hospital workforce. It also reduces the number of deaths. Let's assume that deaths only occur when a patient in an ICU, does not survive. This corresponds roughly to reality. By quarantining old people we prevent 2.5 -.2= 1.7 seniors from entering the ICU and occupying a bed every month, or 10.2 patients per bed over the six-month projection of the HS. Since there are 1.3 million beds that old people would have occupied, had they not been quarantined, we prevent 1.3 x 10.2 = 13.26 million seniors from occupying ICU beds. Chinese data[12] suggests that old people have a mortality rate that ranges between 1.5% an 4.7%. If we presume that this range characterize seniors in the ICU, then the number of deaths prevented is between 199,00 and 620,000 deaths. If we took the average of the two, we get 409,000 lives saved, a very meaningful result.

We can also reduce the load on hospitals by somewhat reducing the average length of stay in the non-ICU. I presume this would be easier to accomplish in acute care beds as opposed to ICU beds. Let me first look at the numbers. As we have seen, working with the HS data and my interpolations of it, by withdrawing seniors from the hospitals we reduce the patients occupying a regular bed from 2.0 to 1.1. Let's assume that we can reduce length of stay from roughly seven days, ¼ of a month, to five days, or .167 of a month. We can use the following table to calculate how many beds we would save.

[12] https://www.statnews.com/2020/03/16/lower-coronavirus-death-rate-estimates/

**Table 12: The impact of reducing length of stay**

| patients | length of stay | Patient days |
|---|---|---|
| 1.1 | 0.25 | 0.275 |
| 1.65 | 0.167 | 0.275 |

If 1.1 patients stay for .25 days then the total patient=days a bed supports is .275. if we want a bed to continue to be as "productive" and if the length of stay drops from seven days to five, a bed can support 1.65 patients as against 1.1 patients. Correspondingly, we would need only 1.1/1.65 = 2/3 as many beds to support the same number of patients. If the total number of beds reduced, after having protected seniors from hospitalization is 728,000 then we would save an additional 243,000.

I have some general knowledge on how to reduce length of stay in non-critical care beds, based not on any medical expertise, but on my management consulting experience. If that experience is relevant to the treatment of this virus, it suggests that hospitals can reduce length of stay by applying good practice using standardized protocols and permitting little variation. Patient care under these circumstances must be "industrialized." Whether this is possible under the extremes of the urgent situation we currently face is a separate but important question.

Finally, as everyone now recognizes we can save on building new bed capacity by repurposing current hospital beds. The Society for Critical Care Medicine reports that that in 2010 there were 641,000 total acute care beds, which included 104,000 ICU beds. They note that the number of ICU beds grew 17% from 2000 to 2010. Applying this same growth rate to the last decade for both acute care and ICU beds we get an estimate of 750,00 beds. [13]John Hopkins Center for health security suggested that hospitals release 30% of its beds to treat patients with the virus. Based on these estimate, this releases 225,000 beds. [14]

We can now integrate the results of our different calculations. We can project the following bed savings:

**Table 13: Summarizing how to save on bed construction**

| Action | Beds |
|---|---|
| Withdrawing seniors | 572,000 |
| Reducing length of stay | 242,667 |
| Repurposing beds | 225,000 |
| New bed construction not required | 1,039,667 |
| HS estimates of beds required | 1,300,000 |
| New beds required | 260,333 |

The challenge under this scenario looks far less scary and much more doable.

[13] https://www.sccm.org/Blog/March-2020/United-States-Resource-Availability-for-COVID-19

[14] https://www.hopkinsmedicine.org/news/media/releases/the_johns_hopkins_hospital_launches_capacity_command_center_to_enhance_hospital_operations

## A virtual circle

There are two very important benefits of reducing the load on our bed supply. First, it frees up management, planning, workforce, and material resources to produce the ventilators that are so essential for good care. Second, and more subtly, the rationale for strict social distancing is to pace the rate at which the infection spreads so that the hospital system is not overwhelmed. Everyone susceptible to the infection will eventually get it. It is just a question of when. If we are at much less risk of overwhelming our hospital system we can then relax the social distancing regimen and tolerate a faster spread of the virus. We can move more quickly to restore our economy and protect our supply chain, the very chain we need to respond to the crisis in the first place. In effect, we could create a virtual circle, where:

- By protecting seniors, we reduce the load on the hospital system. As a result we can both release resources to produce ventilators and to build the extra beds we need more readily.
- As we do this, we relax social distance measures, which restores the supply chain and enables us to build the hospital infrastructure we need. This also reduces the risk of business bankruptcy, decreasing the likelihood of a significant recession with its health knock-on effects in terms of more deaths later.
- As the infection spreads more rapidly, the virus "burns itself out" more quickly, at least for this season, and we develop population immunity more quickly. We can accommodate people who get sick earlier with our more prepared hospital system with the requisite number of ventilators and beds. These people will be younger. They are less at risk and will require fewer ICU beds and resources.
- Most importantly we prevent a significant number of deaths of seniors.

The following visual describes the virtuous circle

**An alternate reality?**

One presenting issue is whether or not it is feasible and ethical to quarantine seniors. Some seniors could adapt. For example, they can work from home, are retired, and enough money in the bank and can rely on the love and attention of children, grandchildren and close relatives. Many of these seniors appear to be self-isolating voluntarily. On the other hand, there are seniors who can't readily adapt. They have less money, care for young grandchildren, or live alone. The latter number 11 million! [15] Enforced isolation is not far from imprisonment even if it is "for your own good!,"

One imaginary response—call it my "alternate reality"—is that the federal government in coordination with local governments, charitable and service organizations (such as the Red Cross and Meals on Wheels, public libraries, along with block and neighborhood associations) could—with the right level of coordination, paid staff, and federal and state money—bring resources, help, and succor to seniors who need it. This will reduce the seniors' sense of isolation and enhance their psychological sense of community. Perhaps one way to proceed is to mobilize social services for the isolated first, while at the same time providing inducements and supports to all other seniors, for example subsidizing home food delivery, waived feeds for cable channels, and other such practical measures.

The counterpoint to this argument, or fantasy if you are a skeptic, is two-fold. It is simply too late. But this is the peril lurking in the background of the very effort that led me to write this working paper. We may have no time left. Our planning has been fitful. We did not respond to the early signs of the pandemic in China. President Trump seems reluctant to put us on a true war footing through which the federal government could commandeer the resources we need to prepare quickly. All these inconvenient truths together may be shouting from the hilltop, "Game over!"

The second argument by one dear friend, is that this society is too socially and psychologically damaged to imagine that any campaign for protecting strangers, or perhaps even one's relatives is plausible. We simply lack cohesion. Polarization has fatally undermined our good will. Another dear friend adds, that while many people respond with vivacity and commitment to helping people in natural disasters, the pandemic lacks the visceral qualities of a flood, firestorm, or a 9/11 to provoke people to actions. The bias is to self-protect, a bias paradoxically reinforced by social distancing—or, alternatively, to throw caution to the wind, one response to our failure to respond

## V. A Manhattan Project

Earlier in this working paper I referenced the "Manhattan Project." This was the effort that FDR instigated at Einstein's prodding to marshal the greatest American engineering and scientific talent to build an atomic bomb before the Nazis did. But I am no Roosevelt, Einstein, or Robert Oppenheimer who ably ran the project from its inception to its completion. So let me begin on a personal note.

As a child I watched a popular television show called *Queen for a Day*. It was a 1950s show. A few ordinary women would tell a sad story of their life, and the live audience would vote on

[15] https://www.aplaceformom.com/blog/10-17-14-facts-about-senior-isolation/

whose sad tale was most meritorious. That woman was "Queen for a Day." She received help for her problem—for example, money for her child's surgery, and some gifts that were only tangentially related to her tale. I don't know why I was drawn to the show. Perhaps it was my mother, a Holocaust survivor had her own very sad tale, and a trauma which haunted her and which she could never expunge. Perhaps in responding to the current crisis the trauma of this earlier one which I have internalized, provokes the question, "Why did we not see what was coming?"

So, if I were "Queen for a Day" I would do the following:

- Put the country on a war-footing. Create a war-production board to organize the widest features of the required response to the crisis.
- Announce a quarantine of all seniors.
- Create a command center for organizing federal, state, and local agencies, not-for-profits, and companies to build a system for supporting the seniors in their home. The ethos of the command center would be a military campaign with clear objectives, command power to cut through red tape and an open-ended funding stream. The primary method for ensuring that seniors comply should be through inducement and shaming.
- Use a similar command structure to begin building the hospital supply, the beds, and ventilators that are required. Create a building target based on estimates that consider the kinds of calculations I develop in this working paper. If necessary, commandeer private businesses to meet these targets.
- Build a system for developing and enforcing a standardized protocol for reducing and sustaining a requisite and minimum length of stay in non-ICU beds.
- Protect the supply chain required to produce the infrastructure we need to help us care for the sick. Risk putting people in the field to make this happen.
- Prepare a plan for price controls, as is done in war, should supply shortages emerge.
- Plan forward for relaxing social distancing measures depending on the rate of spread of infections, best measured by the doubling days of deaths. The sooner we confirm its wide spread, declare an end to the practice and restart the economy.
- Develop a plan for preventing the bankruptcy of small businesses. Rather than focus on loans, which only adds to future business expense, give small businesses contracts that commit all levels of government to buy these businesses' products and services over the next year. Businesses can use these contracts to secure lines of credit with their banks.
- For all initiatives focus at all the times on the bottlenecks. Don't try to get everything right, just release the bottlenecks.

This thrust of this proto-plan is partly a response to the constricted quality of the discourse to date about how to cope with the crisis. The epidemiologists have dominated the discussion to our great cost and injury. The public health perspective is essential, but we desperately need system thinkers, project managers, enterprise builders, corporate CEOs, economists, and engineers. The time for calibrating one more model is long past. As a systems-psychodynamic theorist, I am interested in understanding how it came to pass that a war against a plague became a public health story alone. One hypothesis is that the public health professionals have filled the vacuum because the command center—the President—has been too passive, reactive, and without the capacity to inspire and direct. But that is a conversation for another day.

My dearest reader: I have no influence in this world, beyond my limited personal and professional sphere. I wrote this working paper with a degree of urgency, as a way enacting the limited agency I have, which is my capacity to think, and put out good ideas into the ether. I also wrote this working paper as one way of coping with my own anxiety by imagining, fantasizing, that I could have some effect on the looming crisis. But if you feel similarly urgent and some or any of the ideas here resonate, I urge you to find your best way of "shouting it from the hilltop." We need many more voices from many different disciplines to respond to the current crisis.