

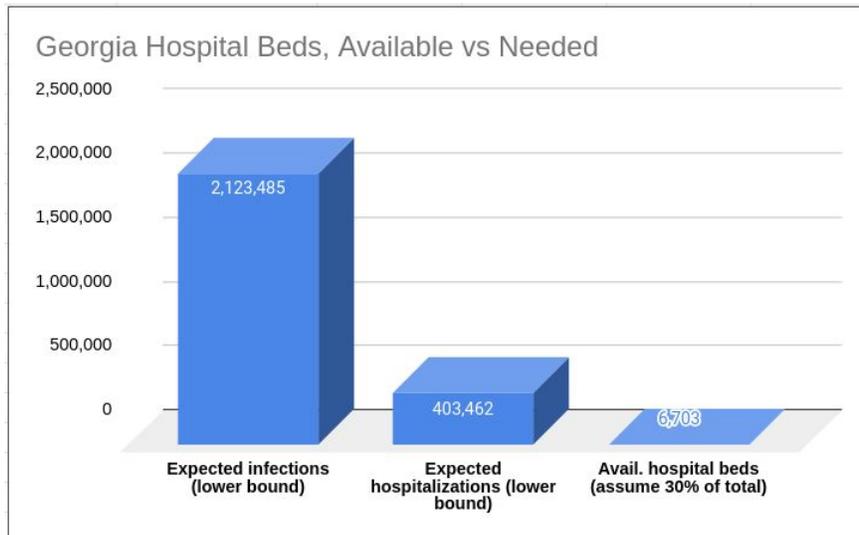
### Rough Analysis calling for shutdown

In short: "We can either run out of everything by a little bit over a couple months, or run out of everything really badly and really soon."

**Slightly longer:** "The math is eerily simple: Georgia's population is 10 million. 20% will fall sick, and of those, 20% will end up hospitalized: so, 400,000 people need hospital beds. However, the state only has 22,000 available beds. But it's even worse than that: 70% of beds are in use, so we only have 6,600 beds. And the 20% infection rate is if we take action *now* -- otherwise, it's 60%".

### Detailed analysis with graphs:

Based on the concept of "[flattening the curve](#)". I ran a rough but straightforward analysis **specific to our state (Georgia)'s hospital capacity**. I graphed the number of hospital beds against expected hospitalizations.



(my analysis)

Based on these numbers, we would need to slow the spread of COVID19 over **1.9 to 5 years** to not overwhelm the state healthcare system.

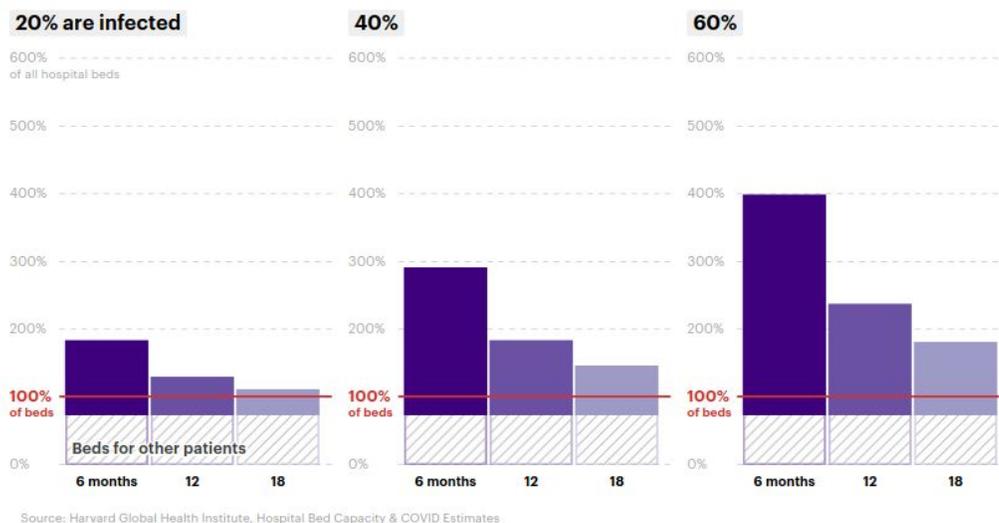
The analysis is as follows:

Total hospital beds	22,344	(GA, staffed beds) [1]
Avail. hospital beds (assume 30% of total)	6,703	
Expected infections = infection rate * population		
Infection rate	20%	(Lower bound) [2]
Population	10,617,423	(GA, 2019) [3]
Expected infections	2,123,485	
Expected hospitalizations = expected infections * hospitalization rate		
Hospitalization Rate	19%	[4]
Expected # ppl hospitalized	403,462	
Needed months = Needed bed-days / hospital beds / 30		
Length of hospitalization [days]	10	(median) [5]
Flattening required [months] if 20% infected	20.1	
Flattening required [months] if 60% infected	60.2	[2]

(My analysis. Bracketed [sources] are at the bottom of this email).

Although I'm just a random resident, the NYTimes came out with an analysis by Harvard epidemiologists that used the [same statistics to reach about the same conclusions](#) on a national level (but broken up by counties). You can also [go here](#) to select "Atlanta, GA" to see the regional analysis, I have screenshot'd their analysis below;

**This is how many hospital beds will be needed in Atlanta, GA if infections are spread out over 6 months, 12 months or 18 months and...**



(not my graph)

This analysis is important because **overwhelming our healthcare system could increase the mortality rate 10-fold**, not to mention all the deaths from people with normal sickness that can no longer be treated (e.g. organ transplants are already shutting down since they require ICU beds). The 10-fold is according to an analysis of the [difference in mortality](#) between the overwhelmed Wuhan and its surrounding districts, after lockdown.

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I also include here an analysis from <https://covidactnow.org/state/GA> showing why **we need state-wide shelter-in-place** as opposed to the current "urging".

Predicted Outcomes after 3 Months			
Scenario	Estimated Cumulative Infected	Estimated Date Hospitals Overloaded	Estimated Deaths
<b>No Action, Current Trends Continue</b>	>70%	Tue Apr 07 2020	211,000
<b>3 Months of Texas-style delay/social distancing*</b>	>70%	Mon Apr 20 2020	158,000
<b>3 Months of California-style "shelter-in-place"*</b>	5%	outside time bound	6,000
<b>3 Months of Wuhan-style Lockdown**</b>	<1%	never	<1000

\* **A second spike in disease may occur after social distancing is stopped.** Interventions are important because they buy time to create surge capacity in hospitals and develop therapeutic drugs that may have potential to lower hospitalization and fatality rates from COVID-19. [See full scenario definitions here.](#)

\*\* Our models show that it would take at least 2 months of Wuhan-style Lockdown to achieve full containment.

Point of no-return for intervention to prevent hospital overload:  
**Mar 24 to Mar 29**

(not my analysis)

Note the difference, **158,000 deaths instead of 6,000 !**

**As doctors wrote [from Italy](#):** "The beginning of the outbreak had the exact same number of infections in China, Italy, and other countries. The difference is that China strongly and quickly locked down Wuhan and all of the Hubei region 8 days before Italy. **Just 8 days of delay for the Italy lockdown will result in an enormous increase in the number of total deaths in Italy with respect to China.**"

We can see the [trajectory in Italy](#), a nation of 60 million people:

- Feb 25: 322 confirmed cases and 10 deaths.
- **March 1st: 1694 cases** and 34 deaths total.
- **March 9th, Shut down.** 9172 cases and 400 deaths total.
- **On March 19**, 475 people died in a *single* day (3k deaths, 35.7k cases total). The effects of the lockdown will not show up for a few days yet.

Georgia has 10 million people, not 60 million.

- March 19: We have 287 cases, and 10 deaths total, but we have 1/6 the population, so we are at the equivalent of  $(287 \times 6 \approx 1700)^*$  cases. **We are at Italy's "March 1st", we should not wait to be Italy's "March 9th"**

\* (yes, this is two days outdated now)

Italy has surpassed China in number of deaths, and the lesson here is that **waiting will only make things exponentially worse**. China [shutdown](#) a population of 56 million people (in 16 cities) with less than 1300 known cases. **In the epidemic trajectory, that is where Georgia is now** \*. At this point, we absurdly want to be closer to China's numbers than Italy's.

\* (well, was two days ago)

From the above rough analyses, I would like to advocate for two more things in addition to shutting down:

- **Increased capacity:** After locking down, Wuhan built a [1600 bed](#) hospital in 10 days, and still was overrun. Look for any way to increase hospital capacity, including building makeshift hospitals. Capacity includes freeing up ICU beds, sourcing person protective equipment (PPE) (through [donations](#) or [volunteers sewing masks](#), etc.) and ventilators, recruiting nurses and doctors, changing [malpractice](#) regulation
- **In the medium-term, plan for lots of testing and contact tracing:** We can't actually stay shutdown forever. South Korea, China, and other nearby countries have both pursued aggressive tactics that seem to have worked. China reported 1 new (domestic) case yesterday, so there's hope.

An additional benefit of advocating for shutting down widely is that "hotspots" that break out in 1 to 2 weeks will be able to **draw on resources from other regions**, just as Hubei Province did (thousands of doctors and nurses from across China voluntarily flew in to help).

For the medium to longer term measures, please also see this sobering [Imperial College study](#) from 16 March 2020 which applies Italy's figures to Great Britain and the United States.

No employer is going to feel *urged* to close down, and vulnerable populations are still going to work. Humans are social by nature and won't feel *urged* to not see friends. By hesitating about stringent state-wide measures, **we only increase deaths and prolong the economic crisis.**

Thank you kindly for your time,  
--Nancy (22 March 2020)

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**Credit to Prof. [Cathy Wu](#) who did this same analysis for the Greater Boston Area -- after she included me in the analysis, I did the same for Georgia, which resulted in this document.**

### Sources

[1] Am. Hospital Directory [https://www.ahd.com/states/hospital\\_GA.html](https://www.ahd.com/states/hospital_GA.html)

[2] Prof. Mark Lipsitch <https://news.harvard.edu/gazette/story/2020/03/hundreds-of-u-s-coronavirus-cases-may-have-slipped-through-screenings/>

[3] US Census <https://www.census.gov/quickfacts/fact/table/qwinnettcountygeorgia/PST045218>

[4] Journal Am. Medical Association [The Coronavirus Disease 2019 \(COVID-19\) Outbreak in China—Summary of a China CDC Report](#)

[5] Journal Am. Medical Association [Clinical Characteristics of Patients With 2019 Novel Coronavirus \(2019-nCoV\)—Infected Pneumonia in Wuhan, China](#)

p.s. Doctors from Zhejiang University wrote [this handbook](#) based on their hard-earned experiences, please share if you know healthcare workers

This analysis is posted at <http://web.mit.edu/nouyang/Public/shutdown.pdf>.