

Simulated Costs of Hospital Stays Under Different Rates of Covid-19 Transmission

By

Karen M. Jetter

University of California Agricultural Issues Center

This study is an updated and expanded version of a study presented May 8 as part of a series of workshops on COVID 19 research <https://virtualpodium2020.wixsite.com/scienceandchill>

"Annual income twenty pounds, annual expenditure nineteen [pounds] nineteen [shillings] and six [pence], result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery."

Mr. Micawber in Charles Dickens' David Copperfield

Much attention is being given on how to slow the spread of COVID-19 while preventing large economic losses.

In some circles this is considered an either/or choice. Either we focus on the pandemic despite the economic consequences, or we focus on “reopening the economy” despite the health care risks.

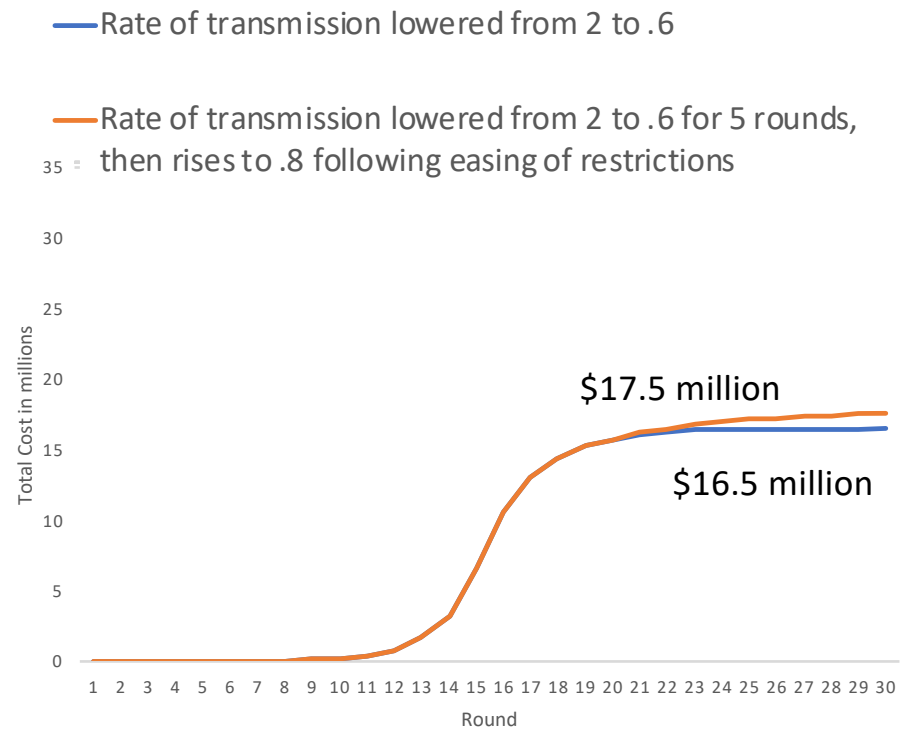
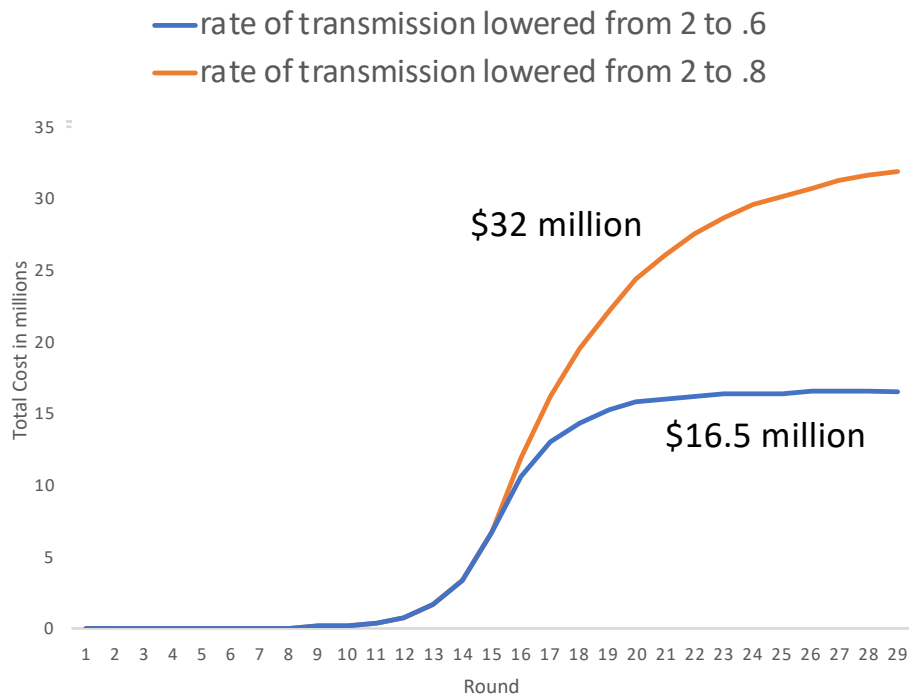
More and more though the linkages between the economic benefits of slowing the disease are becoming apparent. It is not a choice between what is good for public health and what is good for the economy, what is good for public health is also good for the economy.

This is illustrated through a simulation of total hospitalization costs under different rates of spread.

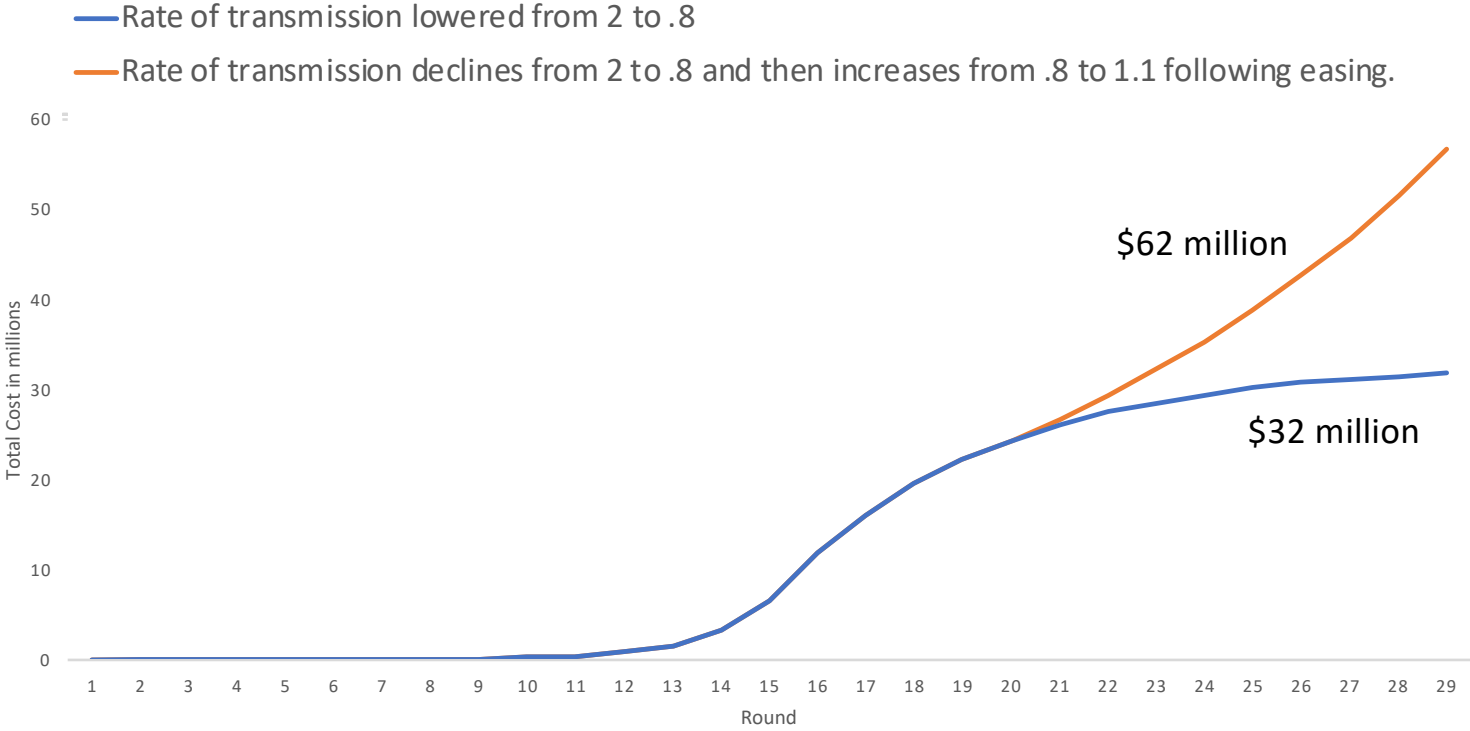
Assumptions

1. Each time period represents a round when 1 person infects others, not a day.
2. The initial rate of transmission is 1 person infects 2 others on average¹.
3. 2.8% of infected people are hospitalized².
4. The average cost of a hospital stay is \$14,300³.
5. The model starts with 1 person infected, disease spreads unchecked for 15 rounds.
6. Once public health spread reduction measures start, the rate of transmission declines by different rates.
7. We compare the total costs of hospitalization for different rates of decline.

Simulated costs of hospital stays (in millions) under different assumptions for the rate of transmission after public disease control policies implemented on round 16.



Simulated costs of hospital stays (in millions) when the rate of transmission goes over 1 over time.



Takeaways

1. The faster the rate of transmission declines, the lower the costs.
2. Keeping stricter protocols for a short period of time and then easing keeps cost lower and comparable to very strict restrictions over the entire period, BUT ONLY IF
3. Incidence falls significantly AND.
4. The rate of transmission stays below 1:1.
5. If rate goes over 1:1 following the easing of public health restrictions, there will be higher costs of hospitalizations and a slower opening of the economy.

Who pays?

We all may have to pay if our insurance rates go up.

The more people become infected and need hospitalization, the more likely it will be that our insurance rates will go up.

How to keep the rate of transmission low:

Each person follows the CDC guidelines.

6 feet distancing between people in public spaces.

Wear a face mask in public.

Wash hands often.

Clean frequently used areas in public spaces frequently.

The choice that everyone makes determines how quickly COVID-19 spreads.

Even small changes can make a difference when it reduces the rate of transmission below 1.

The more that people fight COVID-19 by following public health guidelines, the lower the rate of transmission

The lower the rate of transmission, the lower the economic costs.

References

1. World Health Organization. 2020. Coronavirus disease 2019 (COVID-19) Situation Report – 46. 06 March 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200306-sitrep-46-covid-19.pdf?sfvrsn=96b04adf_4 Note: The estimated rate of transmission was between 2 to 2.5 in the early stages of global COVID-19 spread. Two was used in this analysis.
2. California Department of Public Health. 2020. California COVID-19 by the Numbers. June 30, 2020. <https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/ncov2019.aspx#COVID-19%20by%20the%20Numbers>. Note: The CDC reports hospitalization rates as number infected per 100,000 people in the population. Therefore, the California numbers were used in the analysis.
3. Healthcaredive. 2020. Inpatient COVID-19 cases estimated to cost \$14K per patient. <https://www.healthcaredive.com/news/health-affairs-covid-treatment-cost-predictions/576693/>