A Model-Based Decision Support Tool for Coronavirus Disease in Utah
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INTRODUCTION
The emergence and global spread of COVID-19 has overwhelmed health systems and left countries scrambling to respond. The virus responsible for COVID-19, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has infected 168 million people and caused 3.5 million deaths worldwide since its emergence in December 2019. The speed of its spread in combination with the limited availability of data make dynamical models a useful tool to investigate the factors contributing to its spread and test mitigation strategies.

MODELING PIPELINE
We developed a flexible scenario modeling pipeline that allowed us to quickly tailor models for decision makers. This enabled the comparison of projections of epidemic trajectories and healthcare impacts from multiple intervention scenarios in various locations.

RESULTS/DISCUSSION

METHODS
We use a mathematical model of SARS-CoV-2 transmission in Utah to capture the potential course of the COVID-19 epidemic up to December 31, 2020.

1. **Seeding**: We run a U.S. census data informed model to determine the likelihood of importing cases into the region of interest. Populated with observed COVID-19 cases from February 28, 2020
2. **Epidemic Simulation**: We run a location stratified SEIR model.
3. **Hospitalization and Outcome Generator**: We estimate secondary effects of infection. Each simulation is run through December 31, 2020. Results are averaged across 1000 simulations of each scenario. We present 75% prediction intervals, or the 25th and 75th percentile of each value across all simulations.

CONCLUSIONS

ACKNOWLEDGEMENTS
- 3i seed grant
- COVID-19 Scenario Modeling Pipeline Working Group
- Alex Beams, Emerson Arehart, Andrew Redd
- Fred Adler

1. Uncontrolled epidemic: This scenario assumes no interventions, and no change in behavior by anyone in the population including infected individuals. Baseline transmission assumed to be similar to the early days in Wuhan, China (R0 = 2–3).
2. Voluntary Distancing: his scenario includes 50% compliance to voluntary social distance measures seen in St. Louis during the 1918 influenza pandemic. With all interventions ending on December 31, 2020.
3. 4 week lockdown followed by no intervention: This scenario combines a 4 week lockdown with no follow up. The reduction in R0 is estimated from data from Wuhan’s lockdown, and no followup is the same as the uncontrolled epidemic.
4. Highly effective test and isolate: voluntary social distancing and then a scale up of test, isolate, and contact tracing measures estimated based on South Korea’s response.

• Effective implementation of a state-wide policy of "shelter-in-place" (lockdown) reduces the reproductive number to less than one.
• There is a danger of resurgence of COVID-19 when shelter-in-place is discontinued, depending on whether population surveillance and moderate forms of social distancing are sustained.
• Comprehensive surveillance to isolate cases, trace contacts, and quarantine contacts is most effective when infection rates are very low.