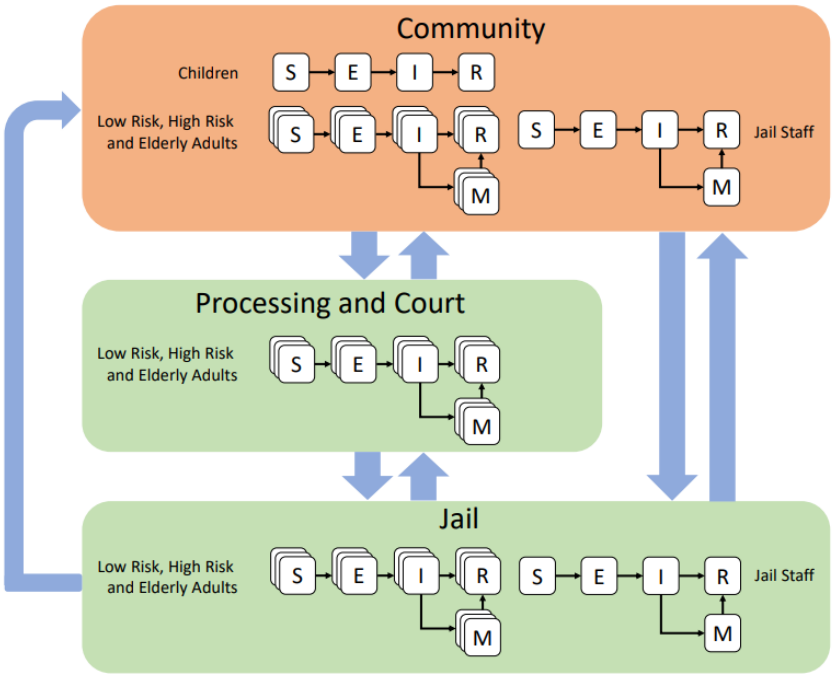
Tusculum University Professor Working to Reduce COVID-19 Deaths among Jail Populations, Corrections Officers, and Surrounding Communities

Tusculum University mathematical scientist Kellen Myers, in collaboration with colleagues from across the country, has helped develop and analyze a new model to better define and predict the risks COVID-19 poses to incarcerated populations – and to the corrections officers, staff, and wider community.

The study, posted to the medRxiv preprint server last month, was undertaken in collaboration with researchers from the University of Tennessee, the University of Pennsylvania, Washington State University, and the American Civil Liberties Union (ACLU).

The research uses real-world data from the Allegheny County Jail system (Pittsburgh, PA). It is determined that operating jails in a "business as usual" fashion will have a significant impact on the incidence of COVID-19 within the jail and in the surrounding community, and a corresponding impact on mortality, and that intervention could reduce this impact.

Jail populations are in constant flux, with individuals frequently incarcerated, released, or transported between the jail, processing facilities, and courthouses. Staff also travel between the jail and their communities on a daily basis. In addition to concerns about the inability to practice social distancing in jail settings, because transmission of COVID-19 within jails may be more rapid and widespread, the movement of individuals between the jail and the community creates a risk to corrections personnel and their families, as well as the surrounding community.



1. A diagram from the manuscript preprint showing the movement of individuals between jail and non-jail populations.

The study recommends widespread reductions in arrests for minor crime, expedited release likewise, and a more effective implementation of social distancing within prisons that could be managed at a reduced capacity. These steps are predicted to reduce mortality among incarcerated people, jail staff, and the community at large. The model predicts, for a medium-sized U.S. city, the potential to save over 1500 lives over the course of the epidemic.

“Social distancing and other preventative measures may be more difficult to implement or maintain in incarcerated populations, especially jails,” Dr. Myers said. “That, on its own, is a grave concern, but considering the dynamics of movement between jails and the larger community, the scope of our concerns should be much greater. The potential to save lives with effective intervention in jail systems is quite substantial.”

The researchers built a mathematical model that projects risk of infection and mortality arising from interaction and movement of people between a jail population and the surrounding community. The model estimates high infection and mortality rates within jails, but also shows a significant risk to corrections officers and other jail staff, as well as a subsequent increase in risk within the surrounding community.

The analysis suggests interventions that will reduce mortality (within jails and beyond), including a combination of deferred arrest and expedited release. Such intervention is projected to reduce the health impact on not just incarcerated populations and jail staff, but to reduce COVID-19 cases in the community by over 15%.

“According to our modeling,” Dr. Myers added, “effective intervention strategies can capitalize on their ability to achieve two goals at once. We can reduce the movement of individuals between jails and the community while also inducing at least a fractional reduction in the total jail population. This will not only reduce the impact (including mortality) of COVID-19 in the community, should the jail become a localized hot-spot for the virus, but it will also reduce the infection and mortality rates within jails by providing a little more space – allowing for greater measures of social distancing, sanitization, and other preventatives.”

2. A diagram from the manuscript preprint showing the reduction in infections, hospitalizations, and deaths, under various arrest-reduction / deferral scenarios.

Dr. Myers also addressed concerns about the impact on the justice system. "While the reduction in incarceration suggested is significant, it can be achieved without raising concerns about the operation of our justice system. This reduction in COVID-19 mortality can be achieved through unobjectionable strategies like replacing misdemeanor arrests with citations or summonses, deferring arrests for overdue fines or tickets, and setting affordable bail for minor offenses."

According to the manuscript, "as the COVID–19 pandemic sweeps the globe, one of the critical functions of epidemiology is to consider how society can transform current practices to increase the health and safety of the public. Given the widespread risk of infection and the high case fatality rates, especially in older or medically compromised populations, the most effective strategies to reduce the impact of the disease may require that we be willing to consider structural reforms to our institutions."

Dr. Myers is an Assistant Professor of Mathematics in Tusculum University's College of Science, Technology, & Mathematics. He has just finished his first year at T.U. and is an expert in computational approaches to complex problems in both pure and applied mathematics. His research touches on topics ranging from models of human social behavior in intelligence applications to the dynamics of economic and epidemiological factors during epidemics, and he has a robust track-record mentoring undergraduate research. This Spring semester, he taught a new course emphasizing computational methods in mathematics. He was recently added to the lineup of faculty who will be facilitating T.U.'s free summer course, *Pandemic Perspectives*, where he will discuss the COVID-19 pandemic from a public health perspective.

3. Dr. Myers, personal photograph