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SIMULATION APPLICATIONS FOR FORECASTING EFFECTIVE RESPONSES IN CORRECTIONS (SAFER-C™)

"This model provides the thread that links all of the major decisions a warden has to make while dealing with the coronavirus crisis; it allows me to link my decisions about officers and inmates in such a way that key outcomes and risks can be directly compared, and it allows me to make the most informed decisions regarding officer and inmate safety."

Guy Bosch, Warden | Minnesota Corrections Facility – Stillwater

BENEFITS OF SAFER-C

The SAFER-C model is designed to help correctional leaders forecast outcomes and manage their facilities while facing the COVID-19 pandemic. The SAFER-C model will provide a practical planning tool to help corrections administrators make critical decisions around mitigation efforts to prevent disease spread and protect both inmates and staff.

COVID-19 DISEASE SPREAD MODEL

CNA's **Center for Justice Research and Innovation**, working with the Minnesota Department of Corrections, developed a simulation and planning tool to help decision-makers estimate the impacts of contagious disease on a correctional facility. The COVID-19 disease spread model is named **Simulation Applications for Forecasting Effective Responses in Corrections (SAFER-C™)**. It builds on CNA's work for the U.S. Navy to model virus spread in contained environments such as Navy ships.

CNA is piloting SAFER-C at the Minnesota Correctional Facility at Stillwater, which houses approximately 1,500 prisoners and employs about 550 staff. The model individually tracks the daily activities of prisoners and staff, using the groups that each infected individual belongs to as the likely conduits for spreading the virus. The model accounts for uncertainty through random draws that simulate a variety of possible outcomes. It builds its results by simulating the factors that contribute to each transmission of the disease:

- The **number of contacts** infected individuals have with others each day.
- Which **individuals are exposed** to those who are infected.
- The likelihood of **virus transmission** to occur from individual to individual.
- The **stages of virus progression** in each individual.

The model characterizes the range of possible outcomes by simulating the daily activities of staff and inmates thousands of times. Decision-makers can compare

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options and answer a variety of "What if?" questions by projecting how virus spread will change depending on specific actions taken. SAFER-C allows correctional administrators to estimate:

- The **risk of introducing an infection** from the local population.
- **Total number of cases, critical care admissions and deaths** — in both inmate and officer populations, and for specific sub-groups within those populations.
- **Timing of disease spread**, peaks, and duration of disease.

The base model for the Stillwater facility has been completed, and the team is working now to incorporate algorithms to help the Department of Corrections determine the potential risks of disease spread associated with restoring prison services such as visitation, vocational programming and volunteer services. The results of this work were briefed to the Commissioner of Corrections.

DATA REQUIREMENTS

SAFER-C relies primarily on data routinely collected within correctional facilities. Individual-level data is needed for every staff member and inmate in a correctional facility:

- A unique identifier
- Location/living unit/work assignment (and sub-groupings, if applicable)
- Age
- Frequency of daily contact with different sub-groups in different physical locations. (This can be estimated; the information is typically collected in staff interviews.)
- Number of individuals in different units or sub-groupings

Note that if not all of this information is readily available, the team may be able to use assumptions or estimates as substitute inputs. Once the model is populated with data — including virus spread parameters from the Centers for Disease Control — different scenarios can be explored. For example, what would be the results in terms of predicted infections and fatalities if the period of isolation for infected individuals were increased by several days? Or, what would be the impact of re-instituting inmate work programs inside a facility?

> "I am very impressed at the thoughtfulness that went into the development of this tool, and I'm excited about the potential it has to help us manage the coronavirus to the benefit of officers and inmates alike."
>
> Paul Schnell | Minnesota Commissioner of Corrections

ABOUT CNA

CNA is a nonprofit research and analysis organization dedicated to the safety and security of the nation. It operates the Institute for Public Research — which serves civilian government agencies — and the Center for Naval Analyses, the Department of the Navy's federally funded research and development center (FFRDC). CNA is dedicated to developing actionable solutions to complex problems of national importance. With nearly 700 scientists, analysts and professional staff, CNA takes a real-world approach to gathering data, working side-by-side with operators and decision-makers around the world. CNA's research portfolio includes global security and great power competition, homeland security, emergency management, criminal justice, public health, data management, systems analysis, naval operations and fleet and operational readiness.

For additional information, or to set up a time to discuss the model in additional detail, please contact:

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