RESEARCH SUMMARY

Examining the Operational Effects of Vaccine Disinformation Campaigns

This summary describes an approach to modeling the spread of vaccine misinformation and disinformation. The approach also examines the implication such information would have for vaccination decisions and, consequently, disease prevalence within a given population, such as a military unit.

The COVID-19 pandemic called attention to the adverse effects that media can have on public perceptions about vaccination safety. The situation is exacerbated by advanced state-sponsored efforts to weaponize the information space. The risk of U.S. military forces operating in a disease-contested environment increases as the risk of spread of emerging infectious diseases increases globally. Historical examples of hesitancy among military personnel to be vaccinated coupled with the recent politicization of the COVID-19 vaccine raise concern about service members' acceptance and uptake of novel medical countermeasures, particularly those created on-demand in response to novel emerging infectious diseases that lack full regulatory approval.

While various modeling approaches for vaccine misinformation and disinformation spread have emerged, operationally relevant models are lacking that link state-sponsored disinformation campaigns with vaccination behavior and disease transmission in military spaces, such as military units. IDA researchers Janet Marroquin Pineda, Robert Cubeta and Emily Parrish set forth an effort to develop a proof-of-concept model to address this gap.

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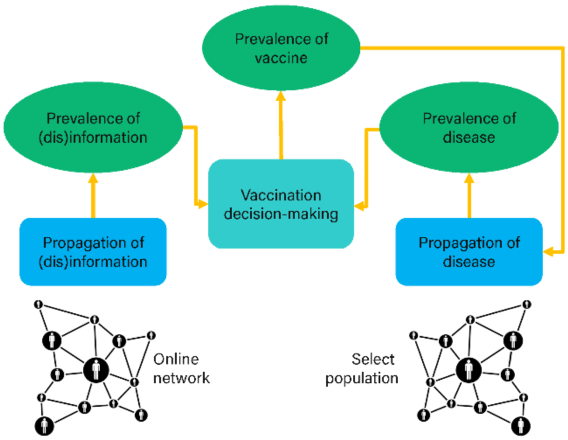
The resulting product consists of a statistical model that simulates the spread of targeted vaccine disinformation throughout an online network, its potential impact on vaccination decision-making within a select population such as a military unit, and the resulting disease transmission in that population. Additional work is required to mature the capability for real-world application, to include selection of relevant input data, parameter tuning, and validation.



The IDA team's modeling framework combines three different approaches: (1) flowing information about the disease and vaccine through the online network using an information propagation model, (2) estimating the probability of members of the network vaccinating based on perceptions of the risks and perceived payoff, and (3) using each node in the population's probability of vaccinating to determine whether each member chooses to vaccinate. From there, classic disease spread models can be used to determine the operational effect on the selected population.

Importantly, the complicated, dynamic, and situationally dependent processes underlying the model are driven by the individual and collective behavior of the simulated population. Adapting these complex processes to modeling required a level of abstraction that limits the model's ability to capture the more nuanced context of human behavior. In the case of an operationally relevant application, a lack of data describing military personnel's sentiment towards novel vaccines and infection risk, as well as the dynamics of these sensitivities in response to official and unofficial sources of information over time, constrains the accuracy and potential utility of the team's modeling approach.

The Department of Defense's plans for rapid development and authorization of medical countermeasures should consider service members' sentiment towards those countermeasures and understand external influences informing countermeasure uptake. IDA therefore recommends that the Defense Department monitor vaccine sentiment in the military population and assess the relative effects of official and unofficial sources of information in a contested information and disease environment.

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