FROM SENSING TO MAKING SENSE

Biological Warfare Agent Clinical Sampling And Analysis: Opportunities And Limitations

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In the absence of effective environmental sampling, the military medical system will likely provide the first indication of the occurrence of a biological warfare attack. Accurate and timely diagnostic results provide critical situational awareness that informs the treatments of ill individuals, the implementation of disease response measures, and revised planning. The Institute for Defense Analyses conducted an analysis to evaluate clinical sampling and analysis tactics techniques and procedures associated with diagnostic capabilities that can inform the recognition of a disease outbreak and the subsequent response process. The analysis included a scientific literature review, the results of which were used to characterize the times during a given disease's progression that a given diagnostic test can generate accurate results. A stochastic individual based model was used to simulate disease progression, patient movement, and clinical sampling and analysis following a biological exposure event. Modeling results were analyzed to determine how changes in sampling and analysis tactics, techniques, and procedures affect the timing and accuracy of diagnostic results. For multiple combinations of diseases and diagnostic technologies of interest, we were unable to find sufficient data to characterize when during the course of illness the diagnostic technology would generate accurate results. Of the disease and diagnostic technology combinations of interest for which sufficient data was available, high test sensitivity at or before symptom onset was not common.