Symptoms-Based, Syndromic Surveillance (ACT S^4)

Diagnoses of pathogens have proven to be inadequate for epidemic prevention. The only opportunity to move pernicious pathogen identifications earlier in the diagnostic timeline is by analyzing patients' symptoms. ACT S^4 has developed the technologies to accomplish this.

The ACT S^4 system created experiential symptom patterns for many Pandemic and Bioterrorism Pathogens (PBP) and other infectious diseases. By comparing each patient's symptoms to multiple pathogens' symptom patterns, ACT S^4 makes it possible to determine the probabilities of which pathogens are most likely to be responsible for patients' symptoms. Public health professionals could then be alerted to intervene and prevent the spread of the identified disease. Additionally, ACT S^4 utilizes a publish and share model to alert other member hospitals to potential outbreaks in the 'community.'

From the onset of patients' first symptoms, the time to obtain culture results is often lengthy and may miss the golden opportunity for pre-epidemic organism identification without ACT S^4's technologies. The Covid-19 virus epidemic is an example. ACT has integrated its PBP technologies with smartphone technologies to capture symptoms. As patients submit their symptoms, ACT S^4 prompts them with additional specific questions and+7 matches their symptoms to the established pathogens' patterns to identify the infecting organisms.

One of the critical pieces of technology necessary to achieve ACT S^4 benefits is its artificial intelligence (AI) capabilities. Patients' earliest symptoms are reported, and the natural language terms are coded by AI into SNOMED codes for analysis by the ACT S^4 rules engine that will feed the continuously improving pathogen symptom patterns. As symptoms patterns become more refined by accumulating data, accuracy will grow progressively and become more reliable. The designation of probable pathogen alert is the actionable step for reporting to the public agency of choice.

Public health professionals must have timely access to information to make the final determination as to whether the data represents a biological threat. ACT S^4 symptoms data are analyzed to assist public health professionals in deciding if a threat is a "Warning" or an "Alert". If even a few patients in a geographic region present with similar symptoms that indicate the probability of a Pandemic or Bioterrorism Pathogen or other infectious diseases, the information can and should be acted upon immediately.

Comparing the patients' symptoms to each pathogen's symptom pattern makes it possible to quantify the closeness of fit (probabilities) between an individual patient's symptoms and the symptom patterns of multiple pathogens. ACT S^4's five metrics are necessary to quantify the probabilities. Output is in percent probabilities for the pathogens. For example: Covid-19 86%; Influenza (Flu) 32%; Common Cold 12%; Pertussis (Whooping Cough) 7%

Conclusion: The ACT S^4 methods deploy AI and other modern technologies that minimize lost time, which is critical in preventing epidemics or ameliorating the devastation caused by a bioterrorism attack. A symptoms-based system like ACT S^4 is the future technology that can preserve countless lives, save untold dollars, and be rapidly deployed.