Evaluating Pandemic Influenza Surveillance and Response Systems in Developing Countries: Framework and Pilot Application

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OBJECTIVE

We propose a framework for evaluating the ability of syndromic, laboratory-based, and other public health surveillance systems to contain an emerging influenza pandemic influenza in developing countries, and apply the framework to systems in Laos.

BACKGROUND

A pandemic caused by influenza A/H5N1 or another novel strain could kill millions of people and devastate economies worldwide. Recent computer simulations suggest that an emerging influenza pandemic might be contained in Southeast Asia through rapid detection, antiviral distribution, and other interventions [1]. To facilitate containment, the World Health Organization (WHO) has established large, global antiviral stockpiles and called on countries to develop rapid pandemic detection and response protocols [2]. However, developing countries in Southeast Asia would face significant challenges in containing an emerging pandemic. Limited surveillance coverage and diagnostic capabilities; poor communication and transportation infrastructure; and lack of resources to investigate outbreaks could cause critical delays in pandemic recognition. Wealthy countries have committed substantial funds to improve pandemic detection and response in developing countries, but tools to guide system planning, evaluation, and enhancement in such places are lacking.

METHODS

We will develop a generic model of pandemic influenza emergence and response appropriate for a developing country to identify behavioral and public health system parameters critical for containment. We will then create a system evaluation framework using these results and existing public health system evaluation tools [3], and apply the framework in Laos. Application will encompass the Early Warning Outbreak Recognition System (EWORS), a regional syndromic surveillance system with 7 sites operating in Laos since 2003; a new laboratory-based influenza surveillance network; and outbreak response systems. Types of information to be considered in this evaluation are demographical, clinical, and laboratory data; public health data quality; assessment of hospitals, laboratories, epidemiologic capabilities, and system operating environment; and ability to validate system enhancements, if accepted. We will gather this information through questionnaires provided to system operators and site visits. We will develop recommendations for system enhancements based upon this information.

RESULTS

The modeling effort thus far has sought to extend pandemic outbreak progression models to include details of surveillance and response systems. Early extension efforts have investigated variables determining response capability, including the percentage of the population covered by the system and timelines for key components of this response (e.g., Figure). These parameters will be combined with outbreak parameters expressing virulence and transmissibility to measure the value of the surveillance and response system to the containment effort.

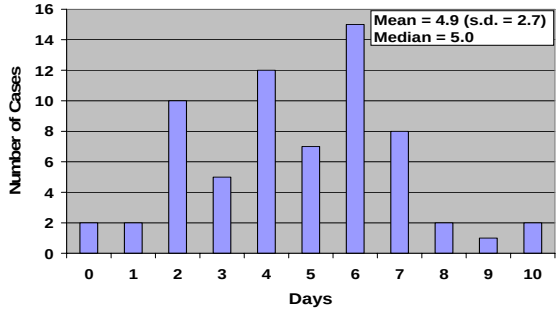

Figure: Interval between symptom onset and presentation for confirmed human H5N1 cases with publicly available WHO data as of April 2006 (N = 66; graph excludes 1 case with Days = 17).

CONCLUSIONS

While this pilot application focuses on surveillance and response capabilities in Laos, the goal of this project is to apply the resulting framework in multiple developing countries. The lessons learned from each subsequent application will help to identify the best methodology for employing such a tool.

REFERENCES

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