

eHealth on the Frontline of Disease Control and Prevention: Ensuring 2-way Communication to Affected Populations

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Unique eHealth methods are increasingly being used in disease outbreak investigations. Epidemiologists require the use of real-time data collection and transfer from remote regions, whose population is often most gravely affected by disease outbreaks. Examples of electronic systems for data collection and monitoring on disease incidence and prevalence are on the rise throughout the world. Electronic data entry from remote sites via cell phone, fixed-line telephone, personal digital assistant, handheld devices and Internet can now be seen in countries such as Rwanda, Guatemala and Thailand.

The impact these systems have is rapid. The speed at which data is gathered and transferred better ensures timely decisions and response. But what happens to that data following a disease outbreak? Too often the information remains in the hands of the investigator or with the ministerial level response body. Too often the information is not incorporated into a national or regional strategy to better ensure prevention of similar outbreaks in the future. Too often this flow of information from disease outbreak site to national response unit is one-way. Reviews conducted by CDC's Disease Control Priorities in Developing Countries Project demonstrate that improving health data flows and information exchange vertically through the health system (from the community to sub-national to national level and vice versa) can be effective in improving health outcomes.

As the use of eHealth strategies increase in disease outbreak investigations so must the information flow back to the affected populations. The strategies and devices used to collect data must also serve a purpose in providing targeted information back to the health care workforce, leaders, and public. This paper explores a few methods in which to better ensure this two-way communication is incorporated into eHealth strategies used for disease outbreak investigations focusing on examples from CDC's international epidemiologic responses.

In order to better support a national health system, emphasis should be placed on this two-way communication network ensuring that timely, targeted information rotates back to the local populations and practitioners. The strategies to ensure this two-way information network focus on the development of methods and technologies which will support four fundamental capacities within the public health system 1) timely and accurate data collection, 2) analysis of data for action, 3) push of action-oriented information into the hands of practitioners, and 4) networked collaboration horizontally within the system. Thus far, CDC's response to disease outbreaks utilizing eHealth strategies, primarily focus in the first two capacities - data collection and analysis of this data. However, CDC is now exploring methods in which to connect these four capacities into an eHealth response to disease outbreaks.

CDC is using information and communication technology (ICT) in disease outbreak data investigation. The agency's International Emerging Infections Program (IEIP) in Kenya is currently using Personal Digital Assistants (PDAs) to collect disease syndrome data from 50,000 people every two weeks in two locations. CDC is also to build global capacity to implement and standardize the operation and application of Humanitarian Information Centers (HIC) in complex humanitarian and other international emergencies to organize data, to promote the use of data standards and to access to data. Specifically, CDC has worked with the United Nations High Commission on Refugees (UNHCR) to develop a Health Information System within refugee camps in Tanzania (later expanded to camps in Kenya and Ethiopia). A paper-based system at the camp level was used to collect and aggregate data. Technology now allows rapid combination and analysis of data from all camps within the country, informing UN policy and the health personnel working in the camps. CDC is using Geographic Information Systems (GIS), and new software can be used to produce rapid statistical samples and to collect and analyze health data in emergencies. GIS mapping tools and related technology are used to improve sampling methods in refugee camps in Thailand and Chad, in order to improve sampling methods.

Additionally, CDC supports analysis of data for decision making at the national level through its Field Epidemiology and Laboratory Training Program (FELTP) – an international epidemiologic capacity enhancement program. Through these and other examples, one-way information flow (data from community level to the national level for decision making) of a two-way eHealth communication network can be a clearly expanded upon. However, to date there have been successful yet few examples of eHealth systems' flow of information back to the affected populations. Currently, three pilot programs are testing eHealth strategies in the delivery of targeted information to the public health care workforce and the public in China, Kenya and Central America. Expanding up on these pilot programs, linking them to data collection and analysis processes and rapidly delivering tailored information back to sub-national and local communities will complete the critical information loop.

CDC is now focusing on ways in which to better develop, implement and evaluate technological applications. These applications will be directed towards resource-poor settings and improving the flow of information from communities to national governments and back to the community in the form of health education and training for the healthcare workforces and affected population. This information flow must encompass both the movement of health and performance data from local to national; and also the transmission of action-oriented information (including training, health messages and performance supports) to the local level. Health information systems in the developing world must be robust and flexible enough to support both routine public health program delivery and the unique challenges of public health emergencies, which occur more frequently in resource-poor settings with catastrophic effects.

This paper will expand upon methods in which to connect these existing eHealth strategies into a health information system used during disease outbreaks, evaluation methods in which to test the system, and indicators on which the system can be measured for impact.