

# Appendix C: Using 9-1-1 and EMS Data for Situational Awareness and Surveillance

## A Review by the Working Group on 9-1-1 Readiness for Pandemic Influenza For the National Association of State EMS Officials

March 21, 2007

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(Note: This review was done as part of the 9-1-1 Working Group's efforts in the creation of the document Preparing for Pandemic Influenza: Recommendations for Protocol Development for 9-1-1 Personnel and Public Safety Answering Points (PSAPs), part of the Implementation Plan for the National Strategy for Pandemic Influenza. It is intended to introduce the topic of public health surveillance to 9-1-1 and EMS stakeholders and review the relatively new body of experience in the use 9-1-1 and EMS data to date.)

**"Syndromic surveillance** for early outbreak detection is an investigational approach where health department staff, assisted by automated data acquisition and generation of statistical signals, monitor disease indicators continually (real-time) or at least daily (near real-time) to detect outbreaks of diseases earlier and more completely than might otherwise be possible with traditional public health methods (e.g., by reportable disease surveillance and telephone consultation). The distinguishing characteristic of syndromic surveillance is the use of indicator data types." (1)

May 7, 2004 report of the Centers for Disease Control and Prevention (CDC) Working Group paper "Framework for Evaluating Public Health Surveillance Systems for Early Detection of Outbreaks"

"911 call data are one of the more commonly used data sources for syndromic surveillance. People who are becoming ill may call 911 for assistance. As a result, an increase in health-related calls to 911 may provide a sign that an epidemic is emerging. Other types of data that are being used include school or work absentee records, pharmacy sales, calls to nurse hotlines, doctor visits, emergency department visits and EMS trip logs. Each of these may provide a warning of the emergence of an increase in disease and prompt public health officials to conduct an investigation." (2)

Dr. James Buehler (member of the CDC Surveillance Working Group) in "The Promise of Syndromic Surveillance," Homeland First Response

### Background

The terrorist attacks on 9-11 and the subsequent anthrax attacks called attention to the need to improve the timeliness and predictive abilities of traditional public health surveillance. The CDC Working Group was created to review and offer recommendations to help guide the development of surveillance systems and the use/evaluation of alternative sources of data. It introduced a key concept in

expanding traditional surveillance: Indicators within a population can precede a formal diagnosis and allow earlier detection of an outbreak.

As described by the CDC Working Group, public health surveillance is the on-going, systematic collection, analysis, interpretation, and dissemination of data about a health-related event for use in public health action to reduce morbidity and mortality and to improve health. In their review, they note surveillance serves at least eight public health interventions. These include:

- Supporting case detection and public health interventions
- Estimating the impact of a disease or injury
- Portraying the natural history of a health condition
- Determining the distribution and spread of illness
- Generating hypothesis and stimulating research
- Evaluating prevention and control measures
- Facilitating planning
- Outbreak detection (i.e. identifying an increase in frequency of disease above the background occurrence of the disease).

Syndromic surveillance is a technique in the last, but very important, intervention: outbreak detection. It utilizes data, such as that obtained during 9-1-1 and EMS, that are not diagnostic of a disease but which might indicate the early stages of an outbreak. (3)

### **How 9-1-1 and EMS Data Can Be Used in Surveillance**

For nearly 30 years people in the U.S. have been conditioned to call 9-1-1 for help. They call 9-1-1 not only for life-threatening emergencies, but frequently for common medical complaints and sometimes as the first access to primary medical care. It is conservatively estimated there are at least 200 million calls made to 9-1-1 every year (4). Continuous “situational awareness” through surveillance and detection of pandemic influenza has been identified as one of three “pillars” of readiness in the National Strategy for Pandemic Influenza (5). Surveillance for pandemic influenza has also been identified as an issue of safety for first responders by 9-1-1 and EMS stakeholder groups.

Tapping into 9-1-1 data for syndromic surveillance offers several advantages. Many 9-1-1 agencies use sophisticated software systems called **CAD (Computer Aided Dispatch)** These systems assist the public safety telecommunicators by helping them to manage the call, quickly gather information, and effectively triage incoming calls into pre-defined categories. This triage is based on the patient’s chief complaint, or primary reason for calling.

Many agencies also use algorithmic or formalized structured expert systems called EMD (Emergency Medical Dispatch) which augment CAD and gather other valuable patient information. Many response agencies use a software version of EMD, which automatically prompts the public safety telecommunicator with specific questions, and which stores information in easily accessible databases. These tools allow the public safety telecommunicator to effectively and quickly categorize/triage patients. Table 1 (see page 52) shows how EMS chief complaints correlate to CDC syndrome definitions.

### **Comparing Data in Real Time**

Once this process is completed (typically within seconds from the time the call is received) syndromic surveillance systems can analyze the information. These systems compare data for differences with historical data. This can be done in real-

time, unlike other systems where diagnostic data can take hours, days or longer before it is available.

Effective syndromic surveillance systems allow EMS and public health officials to determine alerting thresholds, deciding on how sensitive the triggers will be. When a trigger alerts, automatic notification can be sent to designated individuals in public health, EMS, 9-1-1 or others in the system, through fax, email, pager, voice or text message. These personnel can then analyze the data and make a determination as to whether there is a cause for additional action.

Not only are the data from 9-1-1 provided in real-time but they frequently include the precise patient location at the time the call was received by the PSAP. (Patient location can include address, latitude/longitude, map coordinates, postal codes, or other indicators. Which hospital or other facility received the patient, or whether the patient was treated and released, can also be captured.) PSAPs typically serve larger geographic regions which may include an entire city, county or multi-county area. Other health data systems may require numerous separate and distinct systems in order to cover such a large geographic area.

Furthermore, the data generated locally can, in real-time, be sent up-stream, to be part of regional, State or national analysis, which can identify trends that might not be apparent at the local level. Finally, beyond health surveillance, 9-1-1 data typically provide insight and information related to everyday operations as well as other disaster and multi-casualty incidents.

### **Multiple Data Sets**

Increasingly, information from **electronic patient care reports** (ePCRs) may also be available in real-time. ePCRs are computer-based reports filled out by the paramedics or other first responders on the scene with information about the patient's vital signs, presenting symptoms and general assessment. Typically, the ePCR form is originally populated by data begun at the dispatch level in CAD and so has continuity within the system, providing additional accuracy in updating chief complaints and patient information first provided by dispatch. Increasingly, ePCRs are consistent with the National Emergency Medical Services Information System (NEMSIS) and can therefore be compared across jurisdictions.

A call to 9-1-1 results in the acquisition of multiple data sets that have potential for utilization in syndromic surveillance. This data permits both early analysis and detection of potential outbreaks while providing the capability to track individual cases into the health care system for further analysis or other actions. This potential is supported by activities aimed at providing data standards for electronic patient care records. Examples include the work of the Agency for Healthcare Research and Quality (Department of Health and Human Services), and the Integrated Patient Tracking Initiative of Comcare.

### **Attributes of an Effective Syndromic Surveillance System Using 9-1-1/EMS Data**

To be most effective, a community-based syndromic surveillance system is established as a collaborative partnership between many diverse stakeholders including 9-1-1, EMS, law enforcement, fire service, public health, and emergency management, as well as private sector entities. The establishment of such a surveillance system can be a catalyst for relevant communication and the sharing of information between public health and public safety.

The 9-1-1 Working Group identified the following characteristics of an effective surveillance system that utilizes 9-1-1/EMS data:

- Is typically accomplished through a direct interface to health data systems (i.e. the system does NOT require separate entry of information)
- Is automated and does not rely on a user to import data, run queries or otherwise perform tasks manually
- Analyzes information in real-time or near real-time
- Includes a geographic analysis module for monitoring geo-spatial trends
- Is easily and quickly customized to account for new, evolving and emerging health threats
- Includes automated alerting tools to inform authorized individuals when a concerning trend or pattern is identified
- Can ideally be securely accessed by authorized users regardless of their location (i.e. web-based). Outbreaks can occur at any time and may require the ability to quickly share information with public health experts. Includes flexible and customizable alerting thresholds to avoid unnecessary false alerts
- Can aggregate data from disparate systems and provide regional views and analysis
- Supports secure information sharing among collaborating agencies
- Supports dual-use (or multiple use), meaning there are additional benefits and/or stakeholders who are able to use the system

### **Patient Confidentiality and HIPAA**

Most health surveillance efforts are not focused on specific patients, but are looking at trends and patterns in aggregate. However, there may be cases when public health officials are called upon to investigate specific cases which would require receiving and working with Protected Health Information (PHI), as that term is defined by the Privacy Rule promulgated pursuant to the Health Insurance Portability and Accountability Act (HIPAA) of 1996. The HIPAA Privacy Rule is the Federal law governing the use and disclosure of PHI by “covered entities” (certain health care providers, health plans and health care clearinghouses). Some government agencies are “covered entities” and some are not. State law may also address such use and disclosure, and the HIPAA Privacy Rule does not preempt contrary state laws that provide greater privacy protection. The Privacy Rule does not cover the use and disclosure of health information by non-covered entities. Moreover, the Privacy Rule permits “covered entities” to disclose PHI to public health authorities to prevent or control disease, injury or disability (including the conduct of public health surveillance.) Many PSAPs and EMS agencies, as governmental agencies, are not covered by HIPAA. However, covered entities, under the privacy exclusion, including ambulance services and their associated call centers, may use and disclose PHI to a public health authority that is authorized by law to collect this information to prevent or control disease or injury, and vital statistics information. (6)

### **Case Study**

One of the first known syndromic surveillance systems for 9-1-1 was established in Kansas City (MO) in 1999 by Dr. Rex Archer. The 9-1-1 Working Group is aware of several dozen communities throughout the U.S. and Canada that are monitoring 9-1-1 and/or EMS data, (7) from locales as diverse as New York City to Oklahoma City to San Diego. Most are established collaboratively between local or State public health, 9-1-1, emergency management, public safety and EMS authorities, and many share their data to form regional networks.

On November 15, 2003, the Richmond (Virginia) Ambulance Authority (RAA) received an alert from its 9-1-1 surveillance system indicating a surge in influenza symptoms concentrated north of the James River. In Oklahoma, surveillance

software installed at the Emergency Medical Services Authority (EMSA) indicated statistically significant increases in call volume in Oklahoma City on November 16, and in Tulsa on November 20 of that year. In all three cases, the alerts provided public health officials with advance warning of impending epidemics and helped to localize data. EMS and public health officials were able to generate a geo-spatial map of the location and spread of calls that met their criteria, providing additional information to support rapid decision-making.

In the Richmond alert, the system reported that breathing problems were at a 47-percent increase over the previous year. Using the accumulated data from logs, graphs, and charts, the RAA was able to alert health officials of the emerging influenza epidemic. RAA officials were sent alerts and data via e-mail and cellular phone SMS text messages. Alerts were also sent to emergency communications managers and EMS medical directors via pager. (8)

Since then, nearly two dozen communities across the country have collaborated to share information in their regions and across jurisdictions and State lines. Called the Regional Influenza Network (9), each agency in the Network uses one system trigger, configured according to the syndrome groupings agreed upon by the participating agencies. Each trigger may vary slightly depending on local PSAP settings, but each looks at similar patient care complaints.

### **Conclusion**

9-1-1 and EMS field data, while not a substitute for a clinical diagnosis in a hospital or clinic setting, can be a valuable component to an overall system of surveillance, helping to provide continuous situational awareness. It offers the advantages of timeliness, precise location, automation and the ability to collect and analyze information across jurisdictional boundaries. To be most effective, it must involve collaboration and coordinated action across multiple agencies. The potential for early detection of pandemic influenza or other hazards affecting the general health of the community is significant when the data are linked to other elements of the health care system as part of regular, daily operational procedures. (10)

### **References/Sources**

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**Table 1: Translation of EMS Chief Complaint Codes to CDC Syndrome Definitions for Critical Bioterrorism-Associated Agents**

9-1-1 Chief Complaint	CDC Category
Abdominal Pain, Gastroenteritis, Gastritis	Gastrointestinal
Convulsions/Seizures, Headaches, Psychiatric, Suicide, Stroke, Unconscious Fainting	Neurological
Cardiac Arrest, Respiratory Arrest, Death	Death or Near Death
Breathing Problems, Asthma, Dyspnea	Respiratory
Hemorrhage, Non-Trauma Bleeding	Hemorrhagic Illness
Allergic Reaction, Back Pain, Chest Pain, Choking, Heart Problems, Sick Person, Unknown Problem	Undefined Medical (non-traumatic)
Elevated Temp, Hot to Touch, Fever, Flu-Like Symptoms	Fever*

\*Access to fever-related data may not be available from all systems.