

BIO-SURVEILLANCE SYSTEMS

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The prospect of biological terrorism within the United States has been an issue of growing concern for the past decade in military and public health circles and was brought into the public view as a result of the terror attacks in the fall of 2001. It is widely believed that by applying various statistical modeling techniques to data such as emergency department admissions records, school absence reports, pharmacy sales of cold and flu medications, and many other data points, early recognition of biological events can be made. Since the late 1990s millions of dollars have been applied to such surveillance systems through the public health service and the Centers for Disease Control (CDC) and through military research handled by the Defense Advanced Research Projects Agency (DARPA). One research report on the topic of bio-surveillance shows that early detection of a biological event by even one day could mean the difference of life or death to as much as 90% of the exposed population. In addition, the morbidity and associated costs of delayed intervention would further stress the healthcare resources.

Most of the bio-surveillance systems are operated by large hospitals and universities or by government research agencies. Only in the last few years has much thought been given to applying these types of investigative techniques to EMS records. EMS makes an excellent platform for bio-surveillance because EMS responds across social, racial, and economic strata within a given geographic area which provides a good cross section assessment of current community public health status. The larger the area and EMS service, the more responses made, the better the sampling that can be performed.

For the past year I've read numerous reports and articles about Stout Solutions FirstWatch Early Warning Biosurveillance System. I had the opportunity to extensively evaluate the product and talk at length with Jonathan Washko, Developing Partner of FirstWatch at the EMS

Summit in Sand Key Florida in October. I believe Stout Solutions has a very innovative product that has real potential help monitor the public health in areas using their product.

FirstWatch was developed originally in 1999 for MAST in Kansas City as a bioterror surveillance tool. Stout Solutions recognized the potential for commercial marketability of the product and they now have an installed base of 14 locations around the United States.

FirstWatch is very interesting on the technology side. [\[FirstWatch is available either as a standalone product that runs on a local PC as a compiled Microsoft Access application that can link to a customer's database via standard Open Database Connectivity \(ODBC\) links which provides great flexibility to connect to SQL Server, Oracle, DB2, Microsoft Access, even flat files from old data systems; or as a Internet dependant thin client that allows the trigger records to be moved securely to Stout Solutions for processing at their end.\]](#) Currently FirstWatch is geared to evaluate Emergency Medical Dispatch (EMD) records from the 911 side of an EMS operation. FirstWatch allows the user to determine what dispatch natures they wish to monitor and once those are entered, FirstWatch runs a retrospective baseline analysis of the past year or two of data and determines the standard deviation of the desired codes for every hour of every day. Once the baseline information is known, FirstWatch is then configured to run against all new data every few minutes and compare the current results to the historical standard deviation. The user configures alarm thresholds that can page, e-mail, or fax a list of personnel to be notified when the threshold for any of the monitored codes is broken.

Typically the codes to be evaluated and monitored would be codes for respiratory distress, seizures, cardiac arrest, sick calls, unconscious, etc.. These are the types of complaints one would expect with a biological type of attack. While I was talking with Jon at the EMS Summit, Pinellas County Florida which is one of Stout Solutions clients had an activation of one of their triggers of the FirstWatch system. It was simply a flu like outbreak at a couple of nursing home facilities, but never the less the system did pick up the event.

The FirstWatch system is simple enough in design that instead of evaluating 911 EMD records it can also be linked to EMS patient records, ED patient records, public health clinic records, etc.. My personal feeling is there would be more accuracy on a large scale by linking directly

to EMS patient records rather than 911 EMD records simply because many areas have poor 911 systems with no EMD in place while the EMS system in those areas obviously collect records on every patient. As long as the patient records are electronic, FirstWatch could monitor those records with the same effectiveness as EMD records.

FirstWatch is unique because it is a stand alone product, it can interface to nearly any data systems, it is very fast, and it is highly configurable. In addition to the original task of surveillance, it also could be an excellent tool as part of a quality assurance program to evaluate personnel performance parameters such as skills success rates, call cancellation rates, etc.. Other surveillance products I'm aware of targeted at the EMS market are part of larger CAD or EMS management data systems and as such are not as flexible as FirstWatch.

I would suspect that this market will become crowded over the next couple of years, but Stout Solutions clearly has the cleanest EMS specific solution at the moment. To learn more about FirstWatch, see Stout Solutions website at www.stoutsolutions.com

Many other early-detection surveillance systems are currently under development and are in different stages of implementation throughout the United States. In fact I'm aware of at least 24 as of fall of 2003. I've provided a table of a few of the larger surveillance systems. Until outcomes data are available, it will be difficult to determine which systems are superior.

Early Detection and Rapid Notification Surveillance Systems

System	Developer
Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE)	Military http://www.geis.ha.osd.mil/GEIS/SurveillanceActivities/ESSENCE/ESSENCE.asp
Lightweight Epidemiology Advanced Detection & Emergency Response System (LEADS)	Military http://www.scenpro.com/sec_prod_leaders.html
Rapid Syndrome Validation Project (RSVP)	Sandia National Laboratories, New Mexico Department of Health (currently used in several western US states) http://rsvp.sandia.gov
Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE II)	Johns Hopkins University http://www.geis.ha.osd.mil/GEIS/SurveillanceActivities/ESSENCE/ESSENCE.asp
Supporting Public Health Surveillance	Centers for Disease Control and Prevention (CDC)

Through the National Electronic Disease Surveillance System (NEDSS)	http://www.cdc.gov/od/hissb/docs/NEDSS%20Intro.pdf
Real-time Outbreak and Disease Surveillance (RODS)	University of Pittsburgh http://www.health.pitt.edu/rods/

I welcome your comments, criticisms, feedback, and ideas. You may contact me at ejems@cpcstech.com

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