



North Carolina Disease Event Tracking and Epidemiologic Collection Tool

NC DETECT Outcomes

NC DETECT is the Web-based early event detection and timely public health surveillance system in the North Carolina Public Health Information Network. NC DETECT users are able to monitor data from hospital emergency departments (n=104), poison control center calls and ambulance runs for suspicious patterns and specific cases that may indicate events of public health concern. NC DETECT has proven useful for a variety of public health surveillance needs including, but not limited to, early event detection, public health situational awareness, case finding, contact tracing, injury surveillance and environmental exposures.

Early Event Detection

NC DETECT was created to address the need for early event detection in North Carolina. With this system in place, public health officials conduct daily surveillance for clinical syndromes that may be caused by infectious, chemical or environmental agents. Suspicious syndromic patterns are detected using the CDC's CUSUM statistical algorithms from the Early Aberration Reporting System. The early event detection capabilities of NC DETECT have contributed to more timely and effective public health intervention in North Carolina, as illustrated in the following examples.

- A Norovirus outbreak was detected in a sorority at UNC Chapel Hill, in 2006. The spread of the disease was prevented by rapid case finding and implementation of control measures.
- Investigation of a possible familial cluster of meningitis, in Pitt County, in 2006. The NC DETECT signal helped public health officials to trace the meningitis case, and to provide follow up for the whole family of 5 kids and 1 adult through the local health department.
- In 2007, a public health epidemiologist's investigation of a NC DETECT Fever / Rash signal in Rowan County revealed a positive diagnosis of meningococemia (a severe bacterial infection, in the blood stream) in a child, prior to reporting by the laboratory or the attending physician. Meningitis prophylaxis was provided to 30 of the patient's close contacts through the Rowan County Health Department.

Public Health Situational Awareness

With the NC DETECT system in place, surveillance for new conditions can be established easily and rapidly, as demonstrated with injury and illness surveillance after hurricane Ophelia in NC in 2005. Setting up the specific criteria for surveillance took two hours, in contrast with similar surveillance after hurricane Isabel in 2003 which required two months for data collection, entry and analysis. Querying programs maximize accuracy in analyzing the free text ED data to the greatest extent possible. Detecting unexpected cases and outbreaks earlier in their course than traditional disease-based surveillance has allowed prompt implementation of public health control measures when needed.

Hurricane Katrina Evacuees

At the time of hurricane Katrina, 51 of 111 NC EDs were transmitting data daily to NC DETECT. A new "filter" was rapidly applied to capture hurricane-associated events. This filter was applied to data transmitted from August 28, 2005, the date of issue of the voluntary evacuation order in the city of New Orleans. Terms used in this filter included: 'hurri,' 'storm,' 'flood,' 'Katrina,' 'evacua,' 'New Orleans,' 'refuge,' 'Louisiana,' 'Texas,' 'Alabama,' 'Mississippi,' 'Florida,' 'fema' and not ('female'), including variations of misspellings and abbreviations. Surveillance of these data rapidly provided information on the medical needs of hurricane Katrina evacuees in North Carolina. The information

from these sources was available to public health officials at the state level on a daily basis, within 24 to 48 hours of the visits.

Katrina Evacuees: EDs in NC (NC DETECT data 08/28-09/20/2005)

- Illness/medical reason (62%)
- Need for prescription refill or medication (15%)
- Injury (11%)
- Psychiatric/mental health (7%)
- “Need for medical examination” (6%)

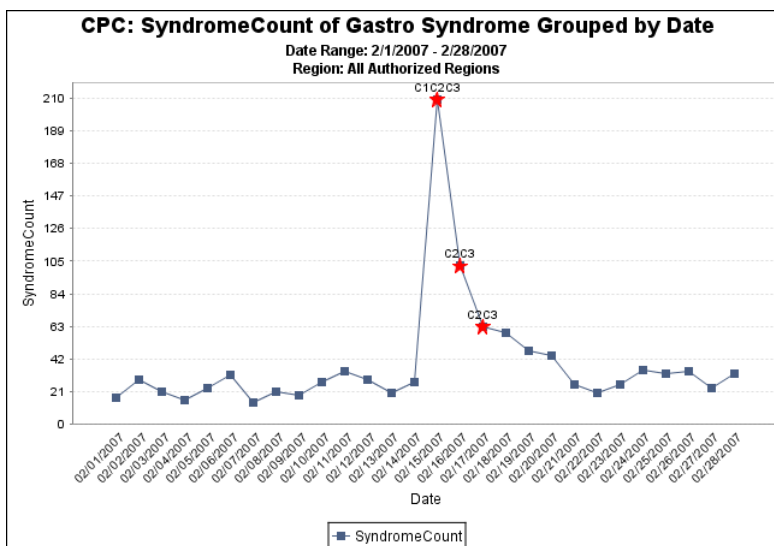
Apex Chemical Explosion

In October 2006, a chemical plant fire forced thousands of people to evacuate from areas of Apex, North Carolina. NC Division of Public Health monitored daily ED data, and hourly data feeds from the poison control center data (CPC) from NC DETECT to monitor potential human health impact. Near real-time investigation of patients identified as associated with this event in the CPC and ED data streams was essential during this event, as the list of chemicals stored at the explosion site went unknown for several days.

Peanut Butter Contamination

On February 14, 2007, the FDA warned consumers not to eat certain jars of Peter Pan or Great Value peanut butter due to risk of contamination with Salmonella Tennessee. Surveillance for peanut butter related ED admissions was established within an hour by querying the chief complaint and triage notes for any mention of peanut. During the week of February 14, statewide hospital data included 135 ED admissions with peanut butter related gastrointestinal complaints from 39 counties. CPC received 370 peanut butter related symptomatic food poisoning calls from 30 counties, and adopted a public health message in line with guidance from the North Carolina Division of Public Health. In this particular example, use of the Poison Center data provided a population-based measure of the reaction to the recall in the general public, from persons affected to a degree that did not warrant a visit to a hospital emergency department.

Figure 1: Calls to Carolinas Poison Center about peanut butter contamination Are evident in the NC DETECT Gastrointestinal Syndrome



Canned Food Botulism Recall

Following reports of four botulism cases in Texas and Indiana associated with commercially canned chili products, the CDC issued a recall in July 2007. The NC Division of Public Health increased surveillance for botulism by sharing available information with public and private health care providers through regular communication and also by issuing an alert with the NC Health Alert Network. The NC Department of Agriculture led the product recall activities.

Using NC DETECT helped the epidemiologists reviewing North Carolina data by: 1) having immediate access to ED data from 104 hospitals throughout the state, where botulism patients would be seen, due to the severity of the disease; 2) having immediate access to all ED patients records matching botulism-like illness, a syndrome continuously monitored with NC DETECT, regardless of this recall; and 3) focusing among them on patients with records that included words that could associate them with the recall.

As an indicator of the “zooming” power of NC DETECT, while 233 patients were picked up by the system between 7/16-25 due to the presence of one or more signs or symptoms compatible with the “botulism-like” case definition, only 9 cases since the beginning of July matched a more narrow case definition, restricted to those with records including key words used in this recall. The situation-specific “filter” was designed and installed within less than two hours.

Heat-related illness

A report to monitor effects of record heat was added to NC DETECT in early August 2007. Results showed an increase of heat-related ED visits as expected, but 15 -19 year olds and 25 – 44 year olds had the highest rates of ED visits. As a result warnings during future heat waves will target these age groups as well as the elderly and those who care for young children.

Case Finding and Contact Tracing

With NC DETECT, users with investigative access rights are able to view patient-specific line listing information and to retrieve the hospital’s original medical record number. With this information, users are able to conduct follow-ups with much greater ease and reduced burden on hospital staff.

- In January 2007, users in Guilford County were able to use the arrival date and time information in NC DETECT to locate potential contacts of an ED patient diagnosed with measles more easily and efficiently.
- During a Hepatitis A outbreak investigation in 2006 in Buncombe County, additional Hepatitis A cases were identified and followed up using NC DETECT.
- NC DETECT and Medical Record Reach back Capability (IMC) were used in a salmonellosis outbreak investigation in New Hanover County (May 2007). Five additional cases were identified using these systems.

Environmental Exposures

Data from poison center calls (CPC) allow public health officials to detect and monitor environmental exposures that may otherwise go unreported. For example, a signal investigation during the summer of 2007 revealed a pesticide exposure in Davidson County. The landlord treated the house with an unknown pesticide. The family of 9 (6 adults, one of them pregnant, and 3 children) developed gastrointestinal (nausea) and neurological (headache) symptoms, and called CPC for advice. Additional public health investigation revealed that the family lives in a house with bats. The family was provided rabies vaccination and immune globulin prophylaxis through the state program.

Numerous clusters of exposure to chemicals have been identified analyzing signals in the NC DETECT CPC data stream. Some examples are shown in Table 1.

Table 1: Carolinas Poison Control Center Chemical Exposure Signals

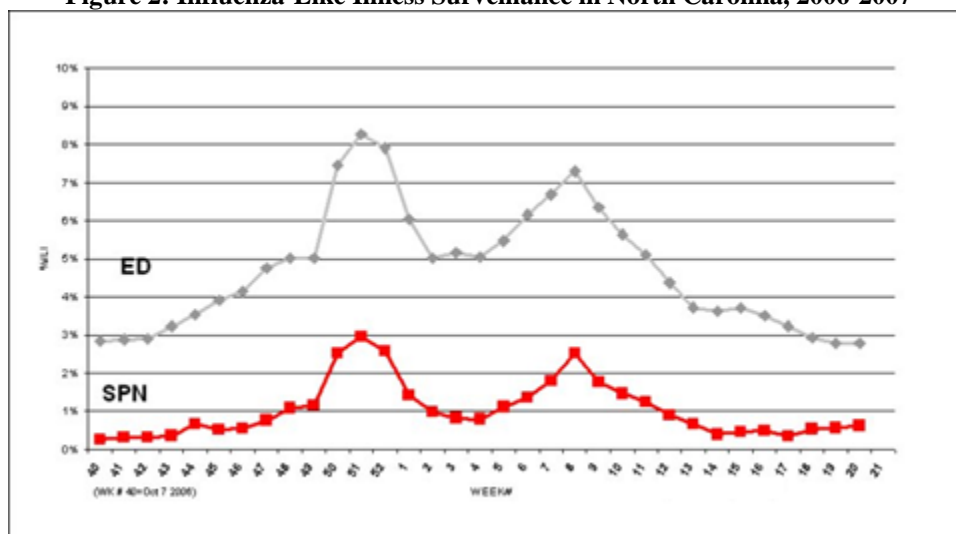
Exposure	Date	# of cases	Site	Co	Syndrome
Mercury	10/20/05	10	Residence	Orange	Gastrointestinal
Prime 2B	11/06/05	3	Hospital	Alleghany	Respiratory, Dermal
Tetrachloroethylene	04/26/06	8	School	Granville	Respiratory, Neuro
Apex Hazardous Exposure	10/06/06	83	Residence		Gastrointestinal, Respiratory, Neuro
Pepper Spray	10/10/06	11	School	Wake	Respiratory, Dermal
Hydrochloric Acid	06/07/07	12	Hotel	Mecklenburg	Respiratory
Lead exposure	06/12/07	5	Residence	Davidson	Gastrointestinal

While some of the CPC signal investigations listed in Table 1 did not pose a widespread public health threat, they demonstrate the ability of NC DETECT to identify both environmental and infectious disease clusters and potential bioterrorism events.

Other Surveillance

The NC DETECT influenza-like illness (ILI) definition is used to monitor the NC influenza season in NC each year, providing data up to two weeks earlier than the traditional, manually tabulated Sentinel Provider Network. The difference in proportion of ILI seen in Figure 2 reflects differences in the case definitions and patient populations rather than a difference in the sensitivity of these surveillance systems.

Figure 2: Influenza-Like Illness Surveillance in North Carolina, 2006-2007



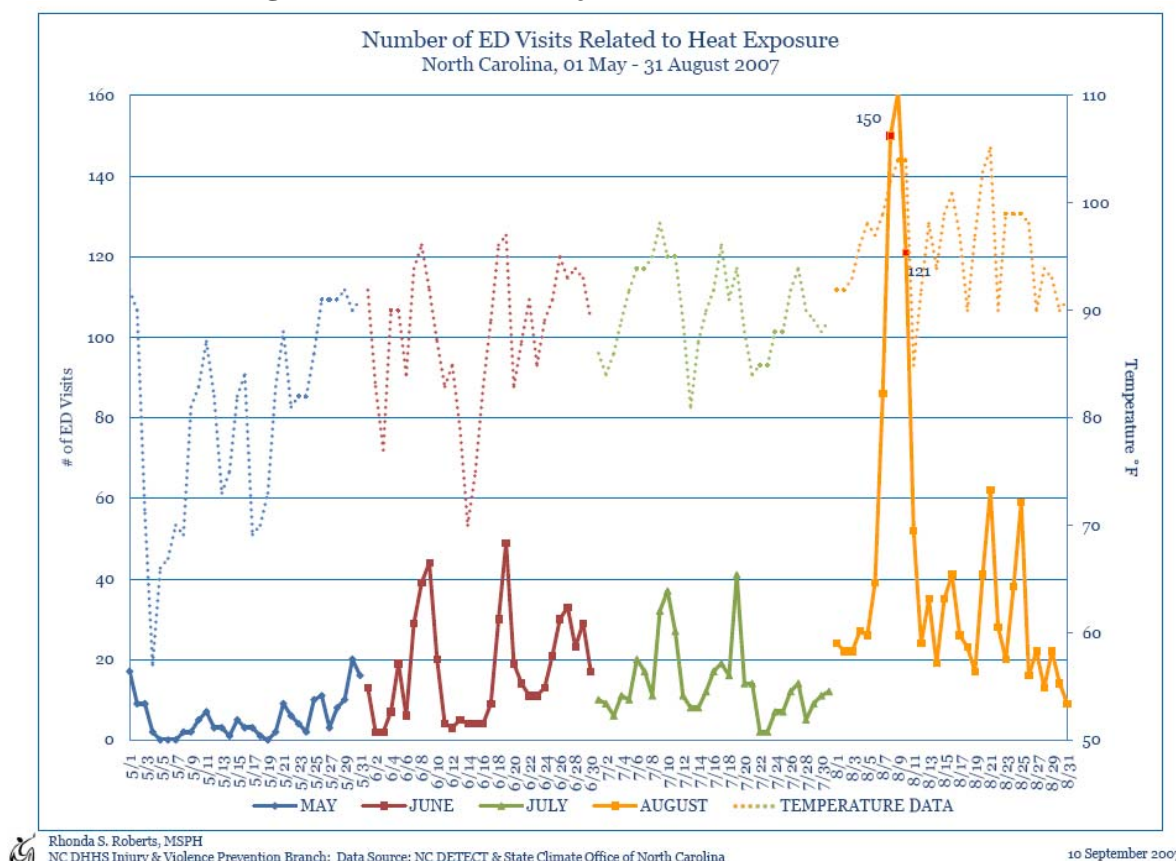
SPN: 74 volunteer practitioners report weekly their patient workload; using ILI case definition: "fever and cough or sore throat."

ED: As of 5/19/2007, 103 hospitals report daily ED visits electronically through the NC DETECT System, using ILI case definition: "ILI cases must include any case with the term "flu" or "influenza" or have at least one fever term and one influenza-related symptom."

In lieu of mandating reporting for varicella at a time when cases were still numerous, public health officials used NC DETECT data to monitor ED visits with Varicella diagnoses, prior to making the disease reportable.

NC DETECT data have also been used for a variety of injury-related analyses, from use of all-terrain vehicles to injuries from specific toys and heat-related injuries. Use of the NC DETECT data for chronic diseases continues to expand.

Figure 3. Heat-related Injuries, North Carolina, 2007



Testimonials

“The greatest strength of NC DETECT is the ability for everyone in the state to determine what disease is prevalent and how fast it is spreading across the state”.

“[NC DETECT] allows us to more quickly identify something. It is a faster timeline...It provides an accurate timeline. It allows us to have a general pulse of what the community is like at all times. NC DETECT validated when our stuff [influenza] started happening. Because we are seeing things earlier, we are able to let our ED and primary physicians know something was up.”

For more information please call (919) 843-2361 or email ncdetect@listserv.med.unc.edu.