

Running the Numbers

*A Periodic Feature to Inform North Carolina Health Care Professionals
About Current Topics in Health Statistics*

*From the State Center for Health Statistics, NC Department of Health and Human Services
<http://www.schs.state.nc.us/SCHS>*

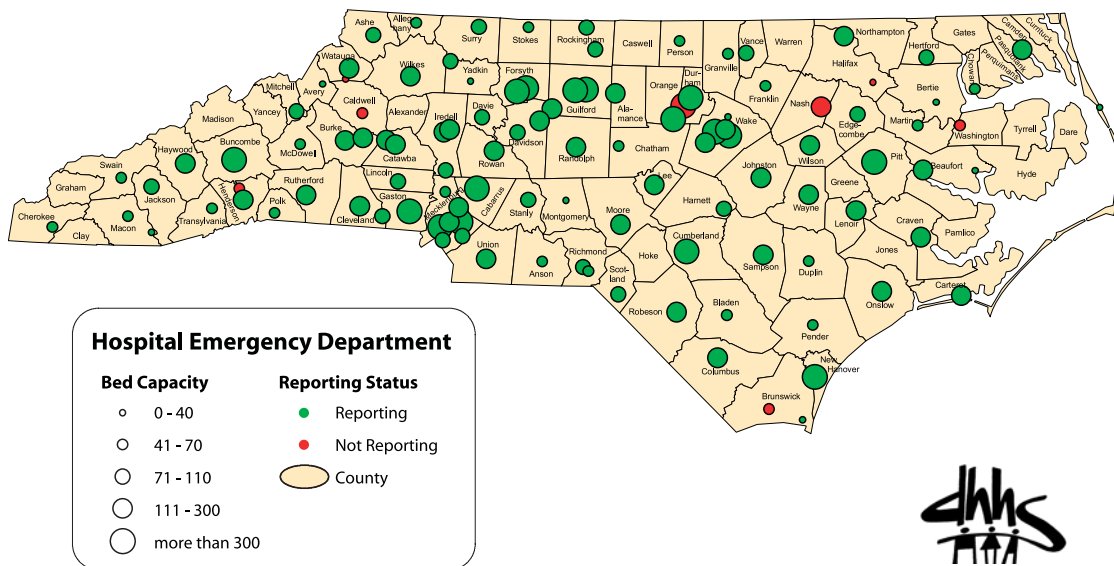
North Carolina Emergency Department Visit Data Available for Public Health Surveillance

The National Center for Health Statistics estimates there were 110.2 million emergency department (ED) visits throughout the United States in 2004 and has documented a steady increase in the number of ED visits over the past decade.¹ Secondary data from ED visit records are timely, comprehensive, population-based, and electronically available through hospital information systems. These data are increasingly in demand for use in biosurveillance and other public health surveillance efforts.

In North Carolina, 111 hospital-based EDs provide unscheduled acute patient care on a 24 hours a day, 7 days a week (24/7) basis. The North Carolina Emergency Department Database (NCEDD) project began in 1999 as a voluntary pilot project to demonstrate the ability to collect and standardize ED visit data from disparate hospital electronic information systems. In 2004 the North Carolina Division of Public Health partnered with the North Carolina Hospital Association and the University of North Carolina at Chapel Hill School of Medicine to create the North Carolina Hospital Emergency Surveillance System (NCHESS) and the provision of ED data for public health surveillance became mandatory.

As of July 1, 2007 93% (103 of 111) of hospital-based, 24/7 acute care EDs in North Carolina are providing visit data electronically at least once a day through NCHESS to be used by the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT). (See Map 1.) NC DETECT is the web-based early

Map 1.
Hospital Emergency Departments Reporting to NC DETECT by General Bed Capacity As of July 1, 2007 (103 hospitals reporting)



State Center for Health Statistics

continued on page 290

event detection and timely public health surveillance system in the North Carolina Public Health Information Network (See <http://www.ncdetect.org>). The ED data in NC DETECT include all visits to North Carolina EDs: patients who were admitted to the hospital, transferred to another facility, discharged home or into law enforcement custody, or who left without being seen or against medical advice. NC DETECT uses the algorithms from the Early Aberration Reporting System (EARS) of the Centers for Disease Control and Prevention (CDC) to monitor several data sources for suspicious patterns. The reporting system also provides broader public health surveillance reports for emergency department visits related to hurricanes, injuries, asthma, vaccine-preventable diseases, occupational health, chronic diseases, and other topics.

For the purposes of biosurveillance, ED visits in North Carolina are grouped into syndromes based on analyses of the chief complaint, initial ED temperature, and history of the present illness (when available). The syndromes are based on the CDC's Syndrome Definitions for Diseases Associated with Critical Bioterrorism-associated Agents.²

NC DETECT serves more than 200 hospital-based and public health users at the local, regional, and state levels. All users must be approved by the North Carolina Division of Public Health before access to the system is granted. Depending on the assigned user role and data source, users have access to secure, web-based county and/or hospital views of the data and can access a variety of tabular and graphical reports. On several reports, users can specify the date ranges and can display the results by ICD-9-CM final diagnosis codes. Reports with dynamic mapping capabilities as well as an ad hoc query tool are under development.

As ED participation in NC DETECT approaches 100%, these data provide population-based analysis opportunities. The NC DETECT database will add approximately 3.5 million new ED visits each year when all hospital EDs are participating. Table 1 presents the distribution of primary diagnoses for the almost 3 million North Carolina

Table 1.
Number and Percent Distribution of Emergency Department Visits, by Major Disease Category (Primary Diagnosis Only): North Carolina, 2006

Major disease category*	ICD-9-CM code range	Number of visits	Percent distribution
All visits		2 977 543	100.0
Infectious and parasitic diseases	001-139	77 549	2.6
Neoplasms	140-239	10 563	0.4
Endocrine, nutritional and metabolic diseases, and immunity disorders	240-279	78 397	2.6
Mental disorders	290-319	112 427	3.8
Diseases of the nervous system and sense organs	320-389	122 958	4.1
Diseases of the circulatory system	390-459	124 264	4.2
Diseases of the respiratory system	460-519	249 851	8.4
Diseases of the digestive system	520-579	156 799	5.3
Diseases of the genitourinary system	580-629	124 667	4.2
Diseases of the skin and subcutaneous tissue	680-709	81 685	2.7
Diseases of the musculoskeletal system and connective tissue	710-739	201 680	6.8
Symptoms, signs and ill-defined conditions	780-799	595 237	20.0
Injury and poisoning	800-999	511 647	17.2
Supplementary classification	V01-V82	80 073	2.7
All other diagnoses	280-289 630-677 740-779	62 793	2.1
Unknown/Missing**		386 953	13.0

* Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM).

** Includes invalid codes and blank diagnoses.

ED visits reported for 2006. One in 5 ED visits received a primary diagnosis related to nonspecific symptoms and conditions (eg, fever, syncope, headache, chest pain) and a similar proportion have a primary diagnosis related to injury or poisoning. Many ED visits (13%) are submitted with missing or unknown primary diagnoses, including visits assigned invalid diagnosis codes.

A distinctive feature of the ED data in NC DETECT is their timeliness. Because the data are submitted and updated twice a day, they are particularly useful for surveillance and situational awareness in rapidly developing outbreaks or disasters. However, not all data elements are immediately available. Thus, early analyses of the data rely on the patient's presenting information, including demographics, chief complaint or reason for visit, history of the present illness, and initial vital signs, whereas analyses that require final diagnosis codes may need to wait 3 to 6 months to ensure acceptable levels of completeness.

NC DETECT allows public health epidemiologists and infection control specialists to significantly increase the speed of detecting, monitoring, and investigating public health events statewide. State and hospital-based epidemiologists monitor the biosurveillance syndromes daily to identify suspicious signals. Epidemiologists systematically review visit-specific information for detailed signal analysis and can also view syndromes and signals stratified by age groups. If an outbreak is suspected, additional investigation measures and appropriate notification can be quickly applied. In addition, rapid initiation of surveillance for new conditions and situations (eg, chemical explosion, peanut butter contamination) can be established by NC DETECT using keyword-based analyses of ED chief complaint and triage notes. These custom reports can be developed and disseminated in less than 2 hours.

All 111 North Carolina EDs are expected to be providing data to NC DETECT by the end of 2007. Efforts are underway to present reports of counts, percents, and population-based rates through the web-based reporting system. Additional users of the data are welcomed, based on application and authorization through the website and the North Carolina Division of Public Health. For further information, contact the authors at ncdetect@listserv.med.unc.edu or visit <http://www.ncdetect.org>.

REFERENCES

- 1 McCaig LF, Nawar EN. National Hospital Ambulatory Medical Care Survey: 2004 emergency department summary. Advance data from vital and health statistics; no 372. Hyattsville, MD: National Center for Health Statistics; 2006.
- 2 Centers for Disease Control and Prevention (October 23, 2003). Syndrome definitions for diseases associated with critical bioterrorism-associated agents. <http://www.bt.cdc.gov/surveillance/syndromedef/index.asp>. Accessed May 14, 2007.

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