

## Reportable Disease Surveillance

### Aaron Fleischauer, PhD, MSPH

#### SLIDE 1

Hello. I'm Aaron Fleischauer, an epidemiologist with the Centers for Disease Control and Prevention assigned to the North Carolina Division of Public Health. In this lecture, we'll discuss reportable disease surveillance – focusing on why we collect surveillance information and what we do with it.

#### SLIDE 2

The objectives for this unit are to 1) know the basis for reportable disease surveillance in North Carolina, 2) describe the steps in the surveillance process, and 3) know how local reportable disease surveillance fits in the overall national notifiable disease surveillance system.

#### SLIDE 3

Good surveillance is the cornerstone for good public health practice. We can define public health surveillance as the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Essentially, effective surveillance allows public health practitioners to monitor the changing health status of their community and accordingly develop and implement appropriate interventions.

#### SLIDE 4

Data from a public health surveillance system can be used for a number of functions including the ability to:

- guide immediate action for cases of public health importance;
- monitor trends in the burden of a disease, including the detection of outbreaks;
- guide the planning, implementation, and evaluation of programs to prevent and control disease (such as immunization recommendations);
- evaluate public policy;
- detect changes in health practices;
- prioritize the allocation of health resources;
- describe the clinical course of a disease; and
- provide a basis for epidemiologic research.

#### SLIDE 5

All 50 US states and US territories have laws, statutes or other regulations that mandate for name-based reporting of communicable or infectious diseases. The state has the authority to monitor a central repository of disease cases where patterns, clusters, and outbreaks may be detected. The list of diseases that are considered reportable varies slightly by state. In North Carolina, the statute mandating reporting of diseases is in Article 6 of Chapter 130A of the General Statutes (GS§ 130A, 134-140), and the actual list of reportable diseases and conditions is provided in rule .0101 of Chapter 41A in the NC Administrative Code. A total of 70 diseases and conditions are defined as *mandatory* reportable in NC.

## **SLIDE 6**

Here is a portion of North Carolina's list of reportable diseases which healthcare providers in the state are required to report. It is important to note that each disease has a required time frame for when reporting written into the mandate – immediate reporting for potential bioterrorism- related diseases, such as anthrax and botulism; 24 hours for the severe or highly communicable diseases, such as cholera and cryptosporidiosis; while 7 days for reporting other of diseases and conditions, such as AIDS and Chlamydia.

## **SLIDE 7**

The reportable disease poster shown here is available on the North Carolina Communicable Disease Manual website (<http://www.epi.state.nc.us/epi/gcdc/manual/toc.html>) and posted in many hospitals and laboratories across the state. The top section of the poster states the legal basis for mandatory reporting of certain diseases and conditions in North Carolina; this is followed by the list of reportable diseases and conditions organized by their reporting time requirements, 24 hours or 7 days. Those outcomes in bold, capital letters are high profile diseases and are immediately reportable to local health departments and to the Division of Public Health.

## **SLIDE 8**

Each reportable disease has a case definition, which is also available in the Communicable Disease Manual. These case definitions are standardized across all states. Standardization allows for common interpretation and classification of a case of disease regardless of location. The case definition is critical for determining whether a patient meets reporting criteria and for assisting in the epidemiologic investigation and response. In this example, the meningococcal meningitis case definition describes the criteria for suspect, probable and confirmed cases based on clinical and laboratory criteria. *(Here, the case definition for meningococcal meningitis, which is shown on the slide, is read as an example).*

## **SLIDE 9**

Case definitions also routinely include epidemiologic criteria such exposure information. In this example, the E. coli Probable case definition includes a clinically compatible case that is epidemiologically linked to another Confirmed or Probable case. "Epidemiologically linked" generally refers to contact with a known case or sharing a common exposure with a known case.

## **SLIDE 10**

Now, we'll walk through the basic steps of the reportable disease surveillance process. In reportable disease surveillance, cases of disease are identified by a physician, laboratory or other health care provider, and occasionally by a day care or nursing home operator, or sometimes from calls from the public. Healthcare providers and laboratories notify local health departments of cases by using the standardized case definitions which outline the clinical, laboratory and epidemiologic criteria necessary to determine case status. Cases are reported to the local health department through a

number of mechanisms, including direct communication, electronic laboratory reporting, and healthcare provider completion and submission of the disease reporting card.

### **SLIDE 11**

Following the initial notification to local public health departments, standardized data collection, which is part of the epidemiologic investigation, involves the collection of demographic, clinical, epidemiologic, and sometimes case contact, information. Local and state health departments likewise, use standardized case definitions to assess and verify that a reported case does, in fact, meet the reporting requirements. The state health department has also developed standard questionnaires for each reportable disease to ensure that important information is consistently collected across the state.

### **SLIDE 12**

Communicable disease nurses and epidemiologists are the stewards of good public health surveillance and are responsible for ensuring that cases are rapidly detected and reported, and that an investigation and associated interventions are quickly and effectively implemented.

### **SLIDE 13**

Information collected from reported cases by communicable disease nurses and epidemiologists during the case investigation are now entered into an electronic disease surveillance system. In North Carolina, the paper-based report card system was replaced by the North Carolina Electronic Disease Surveillance System (or NC EDSS) for local health department reporting to the state Division of Public Health.

### **SLIDE 14**

Electronic disease surveillance allows for real-time and secure information access and sharing between county and state health officials. Data from case reports is routinely analyzed for disease patterns, trends, clusters and outbreaks, and used for response and intervention, developing research hypotheses, and for making policy decisions.

### **SLIDE 15**

De-identifiable surveillance information is shared routinely and voluntarily with the CDC as part of the Nationally Notifiable Disease Surveillance System, and is also shared with public health partners and practitioners throughout the state in a manner compliant with HIPAA (Health Insurance Portability and Accountability Act). Examples of sharing surveillance data are the CDC's Morbidity and Mortality Weekly Report (MMWR), and the North Carolina Epidemiology Section's Epi Notes quarterly. Both periodicals include disease case report tables for selected communicable diseases for given periods of time.

### **SLIDE 16**

The information obtained as part of reportable disease surveillance can be used to initiate interventions, such as outbreak response, immunization recommendations and treatment guidance, alerting the public to known or newly identified risk factors,

targeting education and resources to a particular population of people, or to change or implement any number of public health practices.

#### **SLIDE 17**

Evaluation is critical to promote the best use of public health resources through the development of cost-effective and efficient public health surveillance systems. Recommendations from evaluation or feedback from users improves both the efficiency and effectiveness of the surveillance system.

#### **SLIDE 18**

To summarize, in this model of a reportable disease surveillance system, we can see that case detection begins with the healthcare encounter, and reporting, for the most part, occurs between providers and local health departments. Local health departments often communicate with the state health department on specific disease cases and report all mandatory reportable cases to the state through our electronic disease surveillance system, NC EDSS. Weekly, the state voluntarily transmits de-identified notifiable case information to the CDC. In the next part of this lecture, we will focus on the national notifiable disease surveillance system operated by the CDC.

#### **SLIDE 19**

As stated previously, states participate in the national notifiable disease surveillance system (NNDSS) by voluntarily and routinely sharing disease report information with CDC. The list of nationally notifiable diseases is revised periodically by consensus between the Council of State and Territorial Epidemiologists (CSTE) and CDC. Public health officials at the state health department and CDC continue to collaborate in determining which diseases should be nationally notifiable. CSTE, with input from CDC, makes recommendations annually for additions and deletions to the list of nationally notifiable diseases. For example, a disease may be added to the list as new pathogens emerge (such as SARS), or a disease may be deleted as its incidence declines. NNDSS is managed by CDC's Office of Surveillance, Epidemiology and Laboratory Services.

#### **SLIDE 20**

A brief history of national surveillance is important to understand today's context. In 1878 Congress passed the Port Quarantine Act authorizing the U.S. Marine Hospital Service to collect cases of cholera, smallpox, plague, and yellow fever from US consulates overseas for quarantine purposes to prevent introduction and spread in the US. In 1893, the Interstate Quarantine Report expanded to weekly publication to include cases from states and municipalities. In 1902, Congress re-organized the US Marine Hospital Service to the US Public Health Service and authorized the US Surgeon General to provide standard forms for collection, compilation, and reporting at the national level. In 1912, State and Territorial Health Authorities and the US Public Health Service agreed to formalize state to federal reporting of immediate telegraphic reporting of 5 infectious diseases and monthly reporting by letter of an additional 10. Subsequently, at the 1950 annual meeting of State and Territorial Health Officers, it was agreed that state and territorial epidemiologists would determine, with the US Public

Health Service, the list of nationally notifiable diseases at an annual meeting. This led to the birth of CSTE. And in 1961, CDC assumed responsibility for the collection and publication of data concerning nationally notifiable diseases and the publication of the MMWR.

### **SLIDE 21**

During the last 50 years the NND list has been revised periodically. Today there are approximately 60 nationally notifiable diseases and conditions. Select diseases have been deleted as incidence declines and added as diseases emerge. For example, a novel influenza A virus infection, a strain not observed before in the population, became notifiable in 2007. Another interesting example is that of smallpox, which had been removed from the list about a decade after the disease was eradicated, then was recently re-inserted in the list because of the concern that it may resurface as a result of biological terrorism. It is also important to note that there are some differences in a state's mandatory reportable disease list and the national notifiable disease list.

### **SLIDE 22**

More recently, in 2001, CSTE adopted the position statement "Standardizing the structure of public health case definitions for diseases and conditions placed under the National Public Health Surveillance System (NPHSS)", which has allowed for standards in disease case definitions. In 2005, the World Health Organization produced the Revised International Health Regulations which created a national obligation to notify WHO of immediately notifiable conditions. These are diseases and conditions that can cause national and international health crises, such as novel influenza strain, yellow fever, epidemic cholera, bioterrorism, and other public health events of international concern. Last year, CSTE drafted a position statement that categorized the nationally notifiable conditions list into two categories, those that are immediately notifiable to CDC, and those that are routinely notifiable. This year, CSTE approved adding babesiosis and coccidioidomycosis to the list of nationally notifiable conditions. These diseases are uncommon in North Carolina and may or may not be added as reportable conditions in our state.

### **SLIDE 23**

In addition to the national notifiable disease surveillance system, the CDC maintains over 100 other surveillance systems, with many that include international collaborators. These surveillance systems collect data on over 200 infectious and non-infectious conditions from a variety of sources and participants. Some examples of ones that may be more familiar are the Active Bacterial Core Surveillance program, or ABCs; The Foodborne Diseases Active Surveillance Network, or FoodNet, which is a collaborative project among CDC, 9 Emerging Infection Program sites, the U.S. Department of Agriculture (USDA), and the U.S. Food and Drug Administration (FDA)...it consists of active surveillance for foodborne diseases and related epidemiologic studies designed to help public health officials better understand the epidemiology of foodborne disease in the United States; The National West Nile Surveillance System; the Viral Hepatitis Surveillance Program, which collects clinical, serologic, and epidemiologic data pertaining to risk factors of disease acquisition; and the Waterborne Disease Outbreak

Surveillance System that is maintained by the U.S. Environmental Protection Agency (EPA), and CSTE. It is a collaborative surveillance system of the occurrence and causes of waterborne disease outbreaks associated with drinking water and recreational water. Outbreaks reported to this system are collected annually and published every 2 years in the MMWR Surveillance Summary.

#### **SLIDE 24**

As we discussed, weekly, the CDC publishes the MMWR. The MMWR publishes routinely updated data tables and figures for select nationally notifiable disease reports and analyzes the incidence of these diseases to determine whether increases or decreases are being observed. In an MMWR dated February 6, 2009, we can see that in Figure 1, a slight increase in both Legionellosis and Measles cases were observed when compared with baseline case report information. Decreases were observed for all other select diseases. This table allows statistical comparison of disease incidence compared to baseline or threshold data across the country.

#### **SLIDE 25**

Annually, the CDC publishes results from the calendar year's reported nationally notifiable conditions from each territory and state. Yearly data is compared to previous years and outbreaks, clusters, and seasonal patterns are observed and identified. In the example here in this graph, the annual foodborne botulism data for the previous 20 years identifies 3 significant outbreaks and allows for determination of national baselines and disease thresholds for future reporting.

#### **SLIDE 26**

This concludes our walk through the reportable and nationally notifiable disease surveillance in North Carolina and at the national level. For more information on infectious disease surveillance programs, please consult these resources. Thank you so much for your time. Goodbye.