09-ID-17

Committee: Infectious

Title: Public Health Reporting and National Notification for Hantavirus pulmonary syndrome

I. Statement of the Problem:

CSTE position statement 07-EC-02 recognized the need to develop an official list of nationally notifiable conditions and a standardized reporting definition for each condition on the official list. The position statement also specified that each definition had to comply with American Health Information Community recommended standards to support "automated case reporting from electronic health records or other clinical care information systems." In July 2008, CSTE identified sixty-eight conditions warranting inclusion on the official list, each of which now requires a standardized reporting definition.

II. Background and Justification:

Background[1]

Hantavirus pulmonary syndrome (HPS) is a disease carried by, and transmitted to humans, from rodents. Humans can contract the disease when they come into contact with infected rodents or their urine and droppings. HPS was first recognized in 1993 and has since been identified throughout the United States. Although rare, HPS is potentially fatal.

Patients with HPS typically present in a nonspecific way with a relatively short febrile prodrome lasting 3-5 days. In addition to fever and myalgias, early symptoms include headache, chills, dizziness, non-productive cough, nausea, vomiting, and other gastrointestinal symptoms. Malaise, diarrhea, and lightheadedness are reported by approximately half of all patients, with less frequent reports of arthralgias, back pain, and abdominal pain. Patients may report shortness of breath (respiratory rate usually 26 - 30 times per minute). Typical findings on initial presentation include fever, tachypnea and tachycardia. The physical examination is usually otherwise normal. The diagnosis is seldom made at this stage, as cough and tachypnea generally do not develop until approximately day seven. Once the cardiopulmonary phase begins, however, the disease progresses rapidly, necessitating hospitalization and often ventilation within 24 hours.

Within 24 hours of initial evaluation, most patients develop some degree of hypotension and progressive evidence of pulmonary edema and hypoxia, occasionally requiring mechanical ventilation. The patients with fatal infections appear to have severe myocardial depression which can progress to sinus bradycardia with subsequent electromechanical dissociation, ventricular tachycardia or fibrillation. Hemodynamic compromise occurs a median of 5 days after symptom

[1] Much of the material in the background is directly quoted from the CDC's Hantavirus pulmonary syndrome Website and from CDC 2002. See the References for further information on these sources.

onset. In contrast to the hantavirus-related hemorrhagic fevers (HFRS) seen in Asia, overt hemorrhage occurs rarely in HPS, although hemorrhage is occasionally seen in association with disseminated intravascular coagulation. A positive serological test result on an assay using a hantavirus antigen appropriate to the geographic region, evidence of viral antigen in tissue by immunohistochemistry, or the presence of amplifiable viral RNA sequences in blood or tissue, with compatible history of HPS, is considered diagnostic for HPS.

All hantaviruses known to cause HPS are carried by the New World rats and mice, family Muridae, subfamily Sigmodontinae. The subfamily Sigmodontinae contains at least 430 species of rodents, which are widespread in North and South America. These wild rodents are not generally associated with urban environments as are house mice and the black and Norway rats. However, some species (e.g., deer mouse and white-footed mouse) will enter human habitation in rural and suburban areas.

Several hantaviruses that are pathogenic for humans have been identified in the United States. In general, each virus has a single primary rodent host. The deer mouse (Peromyscus maniculatus) is the host for Sin Nombre virus (SNV), the primary causative agent of HPS in the United States. The deer mouse is common and widespread in rural areas throughout much of the United States, except the southeast and Atlantic seaboard. Although prevalence varies temporally and geographically, on average approximately 10% of deer mice tested throughout the range of the species show evidence of infection with SNV.

Justification

Hantavirus pulmonary syndrome meets the following criteria for a nationally and **standard** notifiable condition, as specified in CSTE position statement 08-EC-02:

- A majority of state and territorial jurisdictions—or jurisdictions comprising a majority of the US population—have laws or regulations requiring **standard** reporting of hantavirus pulmonary syndrome to public health authorities
- CDC requests **standard** notification of hantavirus pulmonary syndrome to federal authorities
- CDC has condition-specific policies and practices concerning the agency's response to, and use of, notifications.

III. Statement of the desired action(s) to be taken:

CSTE requests that CDC adopt this standardized reporting definition for hantavirus pulmonary syndrome to facilitate more timely, complete, and standardized local and national reporting of this condition.

IV. Goals of Surveillance:

To provide information on the temporal, geographic, and demographic occurrence of hantavirus pulmonary syndrome to facilitate its prevention and control.

V. Methods for Surveillance:

Surveillance for hantavirus pulmonary syndrome should use the sources of data and the extent of coverage listed in Table V below.

Table V. Recommended sources of data and extent of coverage for ascertaining cases of hantavirus pulmonary syndrome.

	Coverage	
Source of data for case ascertainment	Population-wide	Sentinel sites
clinician reporting	x	
laboratory reporting	x	
reporting by other entities (e.g., hospitals, veterinarians, pharmacies)	x	
death certificates	x	
hospital discharge or outpatient records	x	
extracts from electronic medical records	x	
telephone survey		
school-based survey		
other _____		

VI. Criteria for Reporting:

Reporting refers to the process of healthcare providers or institutions (e.g., clinicians, clinical laboratories, hospitals) submitting basic information to governmental public health agencies about cases of illness that meet certain reporting requirements or criteria. Cases of illness may also be ascertained by the secondary analysis of administrative health data or clinical data. The purpose of this section is to provide those criteria that should be used by humans and machines to determine whether a specific illness should be reported.[2]

A. Narrative description of criteria to determine whether a case should be reported to public health authorities

Report any illness to public health authorities that meets any of the following criteria:

[2] "Human-based" criteria (described below under "A. Narrative") can be applied by medical care providers and laboratory staff based on clinical judgment and clinical diagnosis. Machine-based criteria (described below under "B. Table") can be applied using computerized algorithms that operate in electronic health record systems, including computerized records of laboratory test orders and laboratory test results; other clinical data systems (e.g., hospital discharge data systems serving multiple hospitals); or administrative data (e.g., healthcare provider billing data, vital records, and EMS data).

A person with a febrile respiratory illness, acute thrombocytopenia (75% decrease over 2/3 days, not immune mediated), who has been healthy prior to the current illness, and has any one of the following:

- Bilateral diffuse interstitial edema
- Clinical diagnosis of acute respiratory distress syndrome (ARDS)
- Radiographic evidence of noncardiogenic pulmonary edema

A person whose healthcare record contains a diagnosis of hantavirus pulmonary syndrome.

A person whose death certificate lists hantavirus pulmonary syndrome as a cause of death or a significant condition contributing to death.

Corroborating evidence for reporting a case is presented in Table VI-B below.

Other recommended reporting procedures

- All cases of hantavirus pulmonary syndrome should be reported.
- Reporting should be on-going and routine.
- Frequency of reporting should follow the state health department's routine schedule.

B. Table of criteria to determine whether a case should be reported to public health authorities

Table VI-B. Proposed Table of criteria to determine whether a case should be reported to public health authorities. Note: The following criteria are proposed for evaluation before general implementation. For purposes of currently implementing reporting the narrative description in VI-A, should be used.

Criterion	Reporting
Clinical Presentation	
fever (> 101°F or > 38.3°C)	N
bilateral diffuse interstitial edema	O
clinical diagnosis of acute respiratory distress syndrome (ARDS)	O
radiographic evidence of noncardiogenic pulmonary edema	O
unexplained respiratory illness resulting in death	C
patient healthy prior to current illness	N
healthcare record contains a diagnosis of hantavirus pulmonary syndrome	S
death certificate lists hantavirus pulmonary syndrome as a cause of death or a significant condition contributing to death	S

Laboratory findings	
autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable cause	C
acute thrombocytopenia (75% decrease over 2/3 days, not immune mediated	N
increased circulating atypical lymphocytes or immature myeloid cells	C
Epidemiological risk factors	
contact with infected rodents, usually in rural settings	C

Notes:
S = This criterion alone is sufficient to report a case, as indicated by the column's heading.
C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—hantavirus pulmonary syndrome, but is not required for reporting.
N = All "N" criteria in the same column – in conjunction with at least one of any "O" criteria in each category (e.g. clinical presentation and laboratory findings) in the same column – are required to report a case.
O = At least one of any "O" criteria in each category (e.g. clinical presentation and laboratory findings) in the same column – in conjunction with all other "N" criteria in the same column - is required to report a case.

C. Disease Specific Data Elements:

Disease-specific data elements to be included in the initial report are listed below.

Epidemiologic Risk Factors:

History of rodent exposure in 6 weeks prior to illness onset
-If yes, date of contact, type of rodent, place of contact.

Outcome of Illness:

Dates of hospitalization;
-If dead, obtain date of death

Other Laboratory Data:

a. Hematocrit
b. WBC
c. Atypical immunoblasts

VII. Case Definition:

A. Narrative description of criteria to determine whether a case should be classified as confirmed is provided below:

Clinical description

Hantavirus pulmonary syndrome (HPS), commonly referred to as hantavirus disease, is a febrile illness characterized by bilateral interstitial pulmonary infiltrates and respiratory compromise usually requiring supplemental oxygen and clinically resembling acute respiratory disease syndrome (ARDS). The typical prodrome consists of fever, chills, myalgia, headache, and gastrointestinal symptoms. Typical clinical laboratory findings include hemoconcentration, left shift in the white blood cell count, neutrophilic leukocytosis, thrombocytopenia, and circulating immunoblasts.

Clinical case definition

An illness characterized by one or more of the following clinical features:

- A febrile illness (i.e., temperature greater than 101.0 F [greater than 38.3 C]) corroborated by bilateral diffuse interstitial edema or a clinical diagnosis of acute respiratory distress syndrome (ARDS) or radiographic evidence of noncardiogenic pulmonary edema, or unexplained respiratory illness resulting in death, and occurring in a previously healthy person
- An unexplained respiratory illness resulting in death, with an autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable cause

Laboratory criteria for diagnosis

- Detection of hantavirus-specific immunoglobulin M or rising titers of hantavirus-specific immunoglobulin G, or
- Detection of hantavirus-specific ribonucleic acid sequence by polymerase chain reaction in clinical specimens, or
- Detection of hantavirus antigen by immunohistochemistry in lung biopsy or autopsy tissues

Case classification

Confirmed: a clinically compatible case that is laboratory confirmed

Comment

Laboratory testing should be performed or confirmed at a reference laboratory. Because the clinical illness is nonspecific and ARDS is common, a screening case definition can be used to determine which patients to test. In general, a predisposing medical condition (e.g., chronic pulmonary disease, malignancy, trauma, burn, and surgery) is a more likely cause of ARDS than HPS, and patients who have these underlying conditions and ARDS need not be tested for hantavirus.

B. Classification Tables

Table VII-B lists the criteria that must be met for a case to be classified as confirmed.

Table VII-B. Proposed table of criteria to determine whether a case is classified. Note: The following criteria are proposed for evaluation before general implementation. For purposes of current notification, the narrative description in VII-A, should be used.

	Case Definition
Criterion	Confirmed
Clinical Presentation	
fever (> 101°F or > 38.3°C)	N
bilateral diffuse interstitial edema	C
clinical diagnosis of acute respiratory distress syndrome (ARDS)	C
radiographic evidence of noncardiogenic pulmonary edema	C
unexplained respiratory illness resulting in death	C
patient healthy prior to current illness	N
healthcare record contains a diagnosis of hantavirus pulmonary syndrome	C
death certificate lists hantavirus pulmonary syndrome as a cause of death or a significant condition contributing to death	C
Laboratory findings	
acute thrombocytopenia (75% decrease over 2/3 days, not immune mediated	C
detection of hantavirus-specific immunoglobulin M	S
detection of rising titers of hantavirus-specific immunoglobulin G	S
detection of hantavirus-specific ribonucleic acid sequence by polymerase chain reaction in clinical specimens	S
detection of hantavirus antigen by immunohistochemistry	S
autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable cause	C

Notes:
N = All "N" criteria in the same column – in conjunction with at least one of any "O" criteria in each category (e.g. clinical presentation and laboratory findings) in the same column – are required to report a case.
O = At least one of any "O" criteria in each category (e.g. clinical presentation and laboratory findings) in the same column – in conjunction with all other "N" criteria in the same column - is required to report a case.
C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—hantavirus pulmonary syndrome, but is not required for meeting the case definition.

VIII. Period of Surveillance:

Surveillance should be on-going.

IX. Data sharing/release and print criteria:

- Notification to CDC for confirmed cases of Hantavirus pulmonary syndrome is recommended.

- All cases are verified with the state health departments before publication. Individual case notifications are made to state and local health departments depending on circumstances and action needed. Final data are published annually in the MMWR Summary of Notifiable Diseases, posted on the CDC website, and presented or published at scientific meetings and in peer-reviewed literature.

- No personal identifying information will be released or published.

X. References:

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3. Centers for Disease Control and Prevention [Internet]. Hantavirus pulmonary syndrome. Atlanta: CDC. Available from: http://www.cdc.gov/ncidod/diseases/hanta/hps/index.htm Last updated: 2006 Oct 26. Accessed: 2008 Oct 14.

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7. Council of State and Territorial Epidemiologists (CSTE). Guidelines for Verification and Reporting of Designated Low Incidence and Internationally Quarantinable Diseases to the National Notifiable Diseases Surveillance System (NNDSS). CSTE position statement 03-ID-11. Atlanta: CSTE; October 2004. Available from: http://www.cste.org.

8. Council of State and Territorial Epidemiologists, Centers for Disease Control and Prevention. CDC-CSTE Intergovernmental Data Release Guidelines Working Group (DRGWG) Report: CDC-ATSDR Data Release Guidelines and Procedures for Re-release of State-Provided Data. Atlanta: CSTE; 2005. Available from: http://www.cste.org/pdffiles/2005/drgwgreport.pdf or http://www.cdc.gov/od/foia/policies/drgwg.pdf.

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