INVASIVE *Streptococcus pneumoniae* (ISP) AND DRUG-RESISTANT *Streptococcus pneumoniae* (DRSP) SURVEILLANCE PROTOCOL

Public Health Action

1. Educate providers and the general public about the conjugate and polysaccharide pneumococcal vaccines.

2. Educate providers and the general public about appropriate use of antibiotics.

3. Educate providers and laboratories to notify their local health department of *all* cases of invasive pneumococcal disease within one week of diagnosis. This is a change from the previous regulation, which required providers to report only drug-resistant cases.

4. Educate laboratories to submit invasive isolates to the West Virginia Office of Laboratory Services for capsular typing.

5. For reported cases of ISP, investigate using the West Virginia *Streptococcus pneumoniae* Case Report Form by collecting information from providers and laboratories and, if necessary, by directly contacting the patient. Antibiotic resistance testing results should be attached to the Case Report Form.

Disease Prevention Objectives

1. To reduce the incidence of ISP among children less than age five by effective use of the conjugate pneumococcal vaccine.

2. To reduce the incidence of ISP among persons age 65 and older by effective use of the polysaccharide vaccine.

3. To reduce the incidence of ISP among people with chronic diseases by effective use of pneumococcal vaccines.

4. To reduce the incidence of drug-resistant pneumococcal disease through education about appropriate antibiotic use.

Disease Control Objective

To identify outbreaks of pneumococcal disease and institute appropriate control measures.

Surveillance Objectives

1. To identify the demographic characteristics of persons with ISP.

2. To understand the risk factors for ISP in West Virginia.

3. To differentiate between pneumococcal vaccine failure and failure to receive appropriate vaccine, as risk factors for ISP.

4. To determine the antimicrobial resistance pattern of ISP isolates in the state of West Virginia.

Public Health Significance

Streptococcus pneumoniae infections are among the leading cause of illness and death worldwide among young children, persons with underlying debilitating conditions, and the elderly. In the United States, pneumococcal disease is estimated to account for 3,000 cases of meningitis, 50,000 cases of bacteremia, 500,000 cases of pneumonia, and 7,000,000 cases of otitis media annually. In the past, isolates of *S. pneumoniae* were susceptible to penicillin; however, penicillin-resistant and multidrug-resistant strains have begun to emerge in the United States and are widespread in some communities. The full impact of the problem is unknown.

The need for surveillance of invasive *Streptococcus pneumoniae* is several-fold:

1. To monitor incidence rates of ISP and DRSP.

2. To monitor the risk factors for ISP and DRSP in West Virginia.

3. To evaluate the effectiveness of immunization policies and programs in our state.

4. To guide the choice of empiric antibiotic therapy for meningitis, depending on the regional prevalence of DRSP.

5. To supply information to discourage inappropriate antibiotic use.

Clinical Description

Pneumococcus is a common cause of pneumonia, otitis media, and sinusitis, particularly in infants and children. Patients with pneumococcal pneumonia may experience an abrupt onset of high fever and shaking chills, productive cough, pleuritic chest pain, respiratory distress, rapid heart rate, malaise, and weakness. When the bacteria invade the blood stream, bacteremia, meningitis, septic arthritis, peritonitis, and other conditions may result. Symptoms of pneumococcal meningitis include a stiff neck, photophobia, fever and headache.

Etiologic Agent

The pathogen is the bacteria *Streptococcus pneumoniae* (pneumococcus).

Reservoir

This bacteria is found only in humans. It is present in the upper respiratory tract of asymptomatic carriers.

Mode of Transmission

S. pneumoniae is transmitted through person-to-person contact via droplet spread, or by direct oral contact or indirect contact with freshly soiled respiratory discharges. Person to person transmission of organisms is common, but illness among casual contacts and attendants is rare.

Incubation Period

The incubation period is not well-determined for this disease but may be as short as one to three days.

Infectious Period

Length of communicability is also unknown, but the disease may presumably be spread any time *S. pneumoniae* is present in respiratory secretions. Treatment with an antibiotic to which the agent is susceptible should render an individual non-infectious within 24-48 hours.

Outbreak Recognition

Although it is possible for anyone to get pneumococcal disease at any time of the year, outbreaks are apt to occur in densely populated living communities, such as nursing homes and jails. Consider the possibility of an outbreak whenever two or more cases occur in a facility within a short period of time. Infections occur most frequently during the winter and early spring. In outbreaks within institutions or closed population groups, immunization with the 23-valent vaccine should be carried out unless it is known that the type causing the disease is not included in the vaccine or the population is fully immunized.

Case Definition for ISP

A **confirmed** case is a clinically compatible case that meets the laboratory criterion for diagnosis (see below).

Laboratory Criterion for Diagnosis of ISP

Diagnosis requires the isolation of *S. pneumoniae* by culture from a normally sterile site, e.g. blood, cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid.

Laboratory Criteria for Diagnosis of DRSP

1. A confirmed DRSP case is a “non-susceptible” *S. pneumoniae* isolate from a normally sterile site. “Non-susceptible” isolate means intermediate- or high-level resistance of the *S. pneumoniae* isolate to at least one antimicrobial agent currently approved for use in treating pneumococcal infection.

2. Resistance should be determined by methods approved by the National Committee for Clinical Laboratory Standards (NCCLS). Quantitative Minimum

Inhibitory Concentration (MIC) standards employing interpretive MIC breakpoints for *S. pneumoniae* should be used.

3. Strains found to be "possibly resistant" to beta-lactams by oxacillin screening (oxacillin zone site <20 mm) should undergo further susceptibility testing.

Preventive Interventions

Invasive pneumococcal disease typically affects the very young and the very old. Correspondingly, there are two vaccines, the first primarily for the elderly and adults with chronic disease, and the second for infants.

1. Out of 83 known capsular types of pneumococcal bacteria, 23 types account for approximately 90% of bloodstream infections in the United States. The 23-valent polysaccharide vaccine (PPV23) contains polysaccharide antigen from these 23 types. It is recommended for all adults ≥65 years of age and persons over age two with any of these underlying conditions: immunocompromised or HIV-positive; chronic cardiovascular or pulmonary disease; anatomic or functional asplenia; recent organ transplantation; alcoholism/cirrhosis of the liver; diabetes mellitus; sickle cell disease; nephrotic syndrome; leukemia; lymphoma; generalized malignancy; or CSF leaks.

2. According to the American Academy of Pediatrics (AAP), the newly licensed pneumococcal conjugate vaccine (PCV7) should be routinely administered to children <24 months of age. Children 24-59 months at highest risk for ISP should also receive vaccine; these are children who have anatomic or functional asplenia, sickle cell disease, or are immunocompromised or HIV-positive.

Refer to the current AAP or Advisory Committee on Immunization Practices (ACIP) recommendations for more complete immunization information.

Surveillance Indicators

- Proportion of cases with complete demographic information.
- Proportion of cases with type of infection and specimen source reported.
- Proportion of cases with vaccine history reported.
- Proportion of cases with underlying medical conditions reported.
- Proportion of cases with antibiotic sensitivity profile reported.
- Median number of days between date of onset of clinical symptoms and date of report to public health authorities.
- Proportion of cases with known capsular type.