

**IN THIS ISSUE: Increased Invasive Pneumococcal Disease in Washoe County**

**INCREASED INVASIVE PNEUMOCOCCAL DISEASE IN WASHOE COUNTY**

**Introduction**

*Streptococcus pneumoniae* (pneumococcus) is a leading cause of illness in young children, and a cause of illness and death among elderly persons and persons with certain underlying medical conditions. *S. pneumoniae* is spread by droplets and causes meningitis, bacteremia, pneumonia and otitis media. There are more than 90 known serotypes for pneumococcus but a relatively limited number of serotypes cause the majority of invasive pneumococcal disease (IPD). In Nevada, although IPD became reportable statewide in 2011, the Washoe County Health District (WCHD) already implemented enhanced surveillance for IPD beginning January 2007, therefore, the incidence of all IPDs has been monitored since 2007.

In early January of 2019, WCHD noticed a continuous increase of IPDs since the influenza season of 2018. A total of 70 cases of IPD were reported in 2018, which corresponded to an incidence of 15.5 cases per 100,000 population, the highest incidence in Washoe County since 2007. The incidence significantly exceeded the 10 year (2008-2017) average incidence rate of 12.3 cases per 100,000. The rate was also greater than the national incidence rate. The incidence rate in the nation was 8.15 cases per 100,000 population<sup>1</sup> among all age groups in 2017 but in Washoe County it was 14.36 cases per 100,000 population. It is important to note these rates are crude incidence rates and not adjusted for age. A comparison study by data analyses among cases reported in 2018 versus cases reported in 2014-2017 was conducted. The proportion of reported cases in zip code 89502 and in 40-49 years of age is greater than other respective groups, which was likely associated with an IPD outbreak in the homeless population identified in December. No other obvious epidemiological links can be identified. Serotypes are not part of routine testing at clinical laboratories therefore data are not available.

With the recent implementation of whole genome sequencing technology at the Nevada State Public Health Laboratory (NSPHL), WCHD made a special request to NSPHL to serotype for pneumococcal isolates sent from hospital labs. The purpose is to find out primary serotype(s) circulating in Washoe County. The objectives of this issue are:

1. To share findings on serotypes
2. To review demographic information, length of hospitalization, outcome of illness, underlying

<sup>1</sup> <https://wonder.cdc.gov/nndss/static/2017/annual/2017-table1.html>

- conditions, vaccination history, and antibiotic susceptibility status for cases with serotype information.
3. To make recommendations for healthcare providers (HCP).

**Serotypes and Pneumococcal Vaccines**

Two different types of pneumococcal vaccines, polysaccharide and conjugate vaccines, are employed in the prevention of pneumococcal disease. Polysaccharide vaccines contain capsular pneumococcal polysaccharide antigens, while conjugate vaccines contain an immunogenic nonpneumococcal protein conjugated to individual pneumococcal polysaccharides.<sup>2</sup>

Eighty-eight percent (88%) of all serotypes that are known to cause invasive disease are included in the 23-valent polysaccharide vaccine, which was licensed in 1983. Before the pneumococcal conjugate vaccine (PCV) was introduced in 2001, over 80% of invasive isolates in children under 5 years of age were included in a 7-valent vaccine. Since February 2010, PCV13 has been licensed and recommended for children in the US and PCV13 replaced the previous version of Prevnar®, known as PCV7. This new vaccine covers the 13 pneumococcal serotypes, which cause the majority of pneumococcal infections in young children. Each of the pneumococcal vaccines is licensed for specific age groups and indications. See following table for serotypes contained in different pneumococcal vaccines and their indications.

Vaccine Name	Serotypes	Indication
PCV13 or Prevnar 13®	1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F	Infants, young children, adults ≥ 65 years AND Others who are at increased risk for getting pneumococcal disease*
PPSV23 or Pneumovax	1, 2, 3, 4, 5, 6B, 7F,8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19A, 19F, 20, 22F, 23F, 33F	All adults ≥ 65 years and for those 2 years or older at increased risk for disease*

\*Increased risks for disease by ages:

**Children at increased risk for pneumococcal disease include:**

- Younger than 2 years old
- Who have certain illnesses (sickle cell disease, HIV infection, diabetes, immune compromising conditions, nephrotic syndrome, or chronic heart, lung, kidney, or liver disease)

<sup>2</sup> <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt11-pneumo.html>

- With cochlear implants or cerebrospinal fluid (CSF) leaks (escape of the fluid that surrounds the brain and spinal cord)

**Adults at Risk for Pneumococcal Disease include:**

- Adults 65 years or older.
- Some adults 19 through 64 years old are also at increased risk for pneumococcal disease, including those:
  - With chronic illnesses (chronic heart, liver, kidney, or lung [including chronic obstructive lung disease, emphysema, and asthma] disease; diabetes; or alcoholism)
  - With conditions that weaken the immune system (HIV/AIDS, cancer, or damaged/absent spleen)
  - With cochlear implants or cerebrospinal fluid (CSF) leaks (escape of the fluid that surrounds the brain and spinal cord)
  - Who smoke cigarettes

**Methods and Major Findings**

A total of 12 pneumococcal isolates from blood were serotyped at NSPHL using WGS technology. The specimens were collected between January 1 and March 1, 2019 from hospitals in Washoe County. Case information was obtained from medical records and WebIZ, the Nevada State Immunization Registry. Major results are described as follows:

**1. Serotypes**

Of 12 cases, 10 (83%) are vaccine contained serotypes, which is consistent with published statistics. Four (4) are serotype 3 and three (3) are serotype 8. The remaining five cases are type 4, 11A, 16F, 22F, 23 A. No obvious epidemiological links can be found among four cases with serotype 3 or three cases with serotype 8.

**2. Demographics**

The median age of the 12 cases is 66 years (range: 36-73 years). Seven (58%) are female. All 12 cases are White, non-Hispanic. Five are residents of Sparks and six (50%) are Reno residents.

**3. Hospitalization**

All 12 cases had bloodstream infection. Eleven of 12 cases were hospitalized with an average length of stay of 7 days (range: 1-14 days). One case was deceased soon after being admitted to the hospital but didn't stay overnight and therefore was not consider hospitalized.

**4. Death**

Three cases (25%) had a fatal outcome. Of these three, two had serotype 3 and one had serotype 8. The median age was 54 years (range: 36-63 years). No other epi-links can be found in terms of age, gender, or zip code among the three fatal cases. All three had two or more chronic conditions. It is important to note that only medical records were reviewed and no interview was done. Sepsis or septic shock is one of the causes of death for these three based on death certificates.

**5. Vaccination History**

Of 12 cases, five (42%) received either PCV13 or PPV23 or both at least one month prior to their illness onset. The remaining seven neither received pneumococcal vaccines before nor was the vaccination record documented in WebIZ. Of the five receiving pneumococcal vaccines, two of them had serotype 23A or 16F, which are not contained in either vaccine.

**6. Underlying Conditions**

All 12 cases had at least one underlying chronic condition and nine of them (75%) had two or more chronic conditions. The most common chronic condition was liver disease (5/12, 42%).

**7. Antibiotic Susceptibility**

Antibiotic	N. tested	Susceptible N (%)	Non-Susceptible
Penicillin	12	10 (83%)	2
Cefotaxime	12	11 (92%)	1
Erythromycin	12	11 (92%)	1
Fluoroquinolones	11	11 (100%)	0
Vancomycin	11	11 (100%)	0
Trimethoprim & Sulfamethoxazole	6	6*	0
Clindamycin	2	2*	0

\*Small number and percentage can be misleading therefore not calculated.

**Recommendations for Healthcare Providers**

WCHD strongly recommends that healthcare providers (HCPs) in Washoe County take the following actions in terms of combating IPD:

1. Encourage patients to keep their vaccinations up to date based on their age and increased risk for pneumococcal diseases. See the section described previously.
2. Educate patients about disease transmission if your patient has an IPD. IPD is spread by droplet. Person-to-person transmission is common, but illness among casual contacts is infrequent. The person is generally no longer infectious after 24 hours of effective antibiotic therapy.
3. Monitor antibiotic susceptibility and always modify your treatment if your patient is resistant to empiric therapy.
4. Always report IPD cases or suspect clusters or outbreaks to WCHD at 775-328-2447 or fax to 775-328-3764.

**Acknowledgement**

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