

Etiologies of Community-Acquired Pneumonia Requiring Hospitalization in an American Indian/Alaskan Native Population

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Introduction

The leading infectious cause of hospitalization in the United States is community-acquired pneumonia (CAP)¹⁻². In the past 2 decades several studies have described the incidence and etiology of CAP in hospitalized patients in the United States, but none of them have included American Indian/Alaskan Native (AI/AN) populations^{3,4}.

The primary objectives of this study was to review the microbial etiology and incidence of CAP in adult AI/AN patients admitted to the Cherokee Nation W.W. Hastings Hospital from January 1, 2016 to December 31, 2016.



Figure 1: Map of Oklahoma. Shaded area represents area serviced by Cherokee Nation W.W. Hastings Hospital

Methods

- The medical records of all adult patients admitted to the hospital with a diagnosis of a respiratory infection from January 1, 2016 through December 31, 2016 were reviewed.
- Inclusion criteria:
 - Age \geq to 18 years, admitted to the hospital
 - Met CAP definition as per IDSA guidelines⁵.
- Exclusion criteria:
 - Hospitalized within the preceding 28 days
 - Had a clear alternative diagnosis
 - Receiving chronic immunosuppressive medication or chemotherapy
 - On home ventilator, had a PEG tube or tracheostomy
 - Presence of cystic fibrosis, cancer with neutropenia, or HIV with a CD4 count $<$ 200.
- A viral pathogen was determined to be present if it was detected on a respiratory multiplex PCR. (Respiratory Panel for FILMARRAY[®] multiplex PCR system)
- Bacterial pathogens were determined to be present if:
 - Gram-positive or gram-negative bacteria were detected in a blood sample, high quality sputum sample, tracheal aspirate or pleural fluid.
 - *Streptococcus pneumoniae* and *Legionella pneumophila* antigens were detected in the urine
 - *Bordetella pertussis*, *Chlamydomphila pneumoniae*, or *Mycoplasma pneumonia* were detected on a respiratory multiplex PCR.
- Incidence rates of CAP were determined by using AI/AN population estimates from the US Census Bureau 2011-2015 American Community Survey.

Results

Between 1/1/2016 and 12/31/2016 the medical records of 763 individual patients with a respiratory infection were reviewed. Of these, 193 met the study inclusion criteria for CAP without any exclusion criteria.

Figure 2: Specific Pathogens Detected

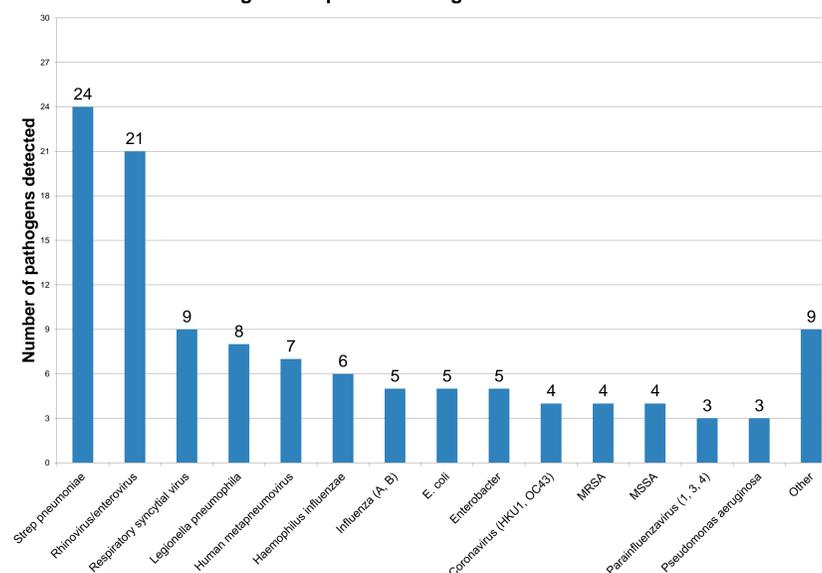


Figure 3: Pathogen Detection

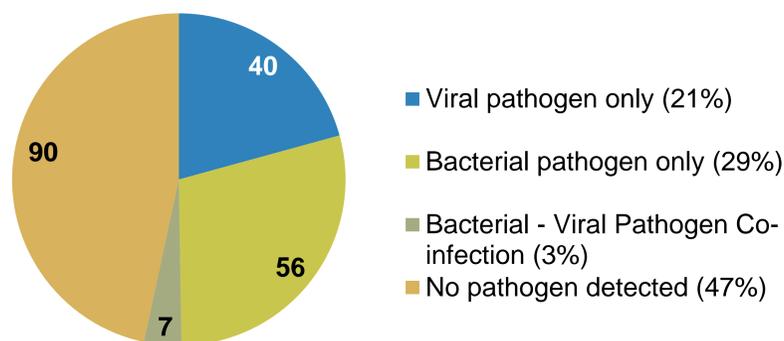


Table 1. Incidence Rates of CAP Requiring Hospitalization stratified by Age Group

Age Group (N)	Incidence Rate per 10,000 AI/AN population (95% confidence interval)
Total (193)	13.6 (11.9,15.7)
18-49 y/o (33)	3.6 (2.5,5.1)
50-64 y/o (60)	18.5 (14.1,23.8)
65-79 y/o (64)	43.2 (33.1,55.2)
\geq80 y/o (36)	102.0 (71.6,140.9)

Table 2. Characteristics and Microbiology Results of Adult AI/AN with CAP Requiring Hospitalization

Characteristic	Adults with Pneumonia Diagnosis (N=193)
Sex – no. (%)	
Female	106 (55)
Male	87 (45)
Age group – no. (%)	
18-49 yr	33 (17)
50-64 yr	60 (31)
65-79 yr	64 (33)
\geq 80 yr	36 (19)
Any underlying condition – no. (%)	145 (75)
COPD	73 (38)
Interstitial lung disease	13 (7)
Pulmonary fibrosis	9 (5)
Diabetes mellitus	91 (47)
Chronic heart disease	62 (32)
Receipt of vaccine/treatment – no./total no. (%)	
Seasonal influenza vaccination	93/193 (48)
Pneumococcal vaccination in adult age \geq 65	88/100 (88)
Admitted to ICU	94/193 (49)
Smoking status – no. (%)	
Active smoker	68 (35)
Former smoker	77 (40)
Never smoker	48 (25)
Radiographic finding – no. (%)	
Multifocal pneumonia	111 (58)
Unifocal pneumonia	82 (42)
Microbiology Laboratory results – no./total no. (%)	
Rapid Strep pneumo urinary Ag positive	17/171 (10)
Legionella urinary antigen positive	8/170 (5)
Rapid HIV positive	0/86 (0)
Respiratory film array positive	47/193 (24)
Blood culture positive	14/181 (8)
Sputum culture positive	41/128 (32)

Conclusions

- A comprehensive laboratory workup in AI/AN patients with CAP identified a pathogen in 53 % of the patients that required hospitalization.
- In patients in whom a pathogen was detected and bacterial-viral coinfection was not present, bacteria and viruses accounted for 58 % and 42% of the cases respectively.
- Streptococcus pneumoniae was the most frequently detected pathogen overall. Rhinovirus/enterovirus and Respiratory syncytial were the most common viral pathogens
- The majority of the patients had at least one comorbid condition
- The incidence of CAP was higher in individuals older than 65 years with the highest incidence in patients 80 years of age or older
- Several differences were found when we compared our results to those of a recent study done in the United States that did not include AI/AN population¹³:
 - In our study a pathogen was detected in the majority of patients (53% vs 38%) and bacteria were more commonly isolated than viruses (24% vs 11%).
 - Our population older than 65 years of age was larger (52% vs 35%), had a higher prevalence of diabetes mellitus (47% vs 26%), and a lower percentage of influenza detected as a pathogen (3 % vs 6%)

References

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