

In-hospital Pneumococcal Polysaccharide Vaccination Is Associated With Detection Of Pneumococcal Vaccine Serotypes In Adults Hospitalized For Community-acquired Pneumonia



Carlos G. Grijalva,^{1,2} Richard G. Wunderink,³ Yuwei Zhu,¹ Derek J. Williams,¹ Robert Balk,⁴ Sherene Fakhran,⁵ D. Mark Courtney,³ Evan J. Anderson,⁶ Chao Qi,³ Christopher Trabue,⁷ Andrew T. Pavia,⁸ Matthew R. Moore,⁹ Seema Jain,⁹ Kathryn M. Edwards,¹ Wesley H. Self.¹

¹Vanderbilt University School Of Medicine, Nashville, TN, USA; ²Geriatric Research Education Clinical Center (GRECC), VA Tennessee Valley, Nashville, TN, USA; ³Northwestern University - Feinberg School Of Medicine, Chicago, IL, USA; ⁴Rush University School Of Medicine, Chicago, IL, USA; ⁵John H. Stroger, Jr. Hospital Of Cook County, Chicago, IL, USA; ⁶Emory University School Of Medicine, Atlanta, GA; ⁷University Of Tennessee Health Science Center/Saint Thomas Health, Nashville, TN, USA; ⁸University Of Utah School Of Medicine, Salt Lake City, Utah; ⁹Centers For Disease Control And Prevention, Atlanta, GA, USA

ABSTRACT

During an etiology study of adults hospitalized for pneumonia that collected urine specimens for serotype-specific pneumococcal antigen detection, we observed that some patients received 23-valent pneumococcal polysaccharide vaccine (PPV23) before urine collection. Some urine samples became positive for specific vaccine pneumococcal serotypes shortly after vaccination, suggesting false positive test results.

BACKGROUND

- Baseline burden estimates of community-acquired pneumonia (CAP) attributable to serotypes covered by the 13-valent pneumococcal conjugate vaccine (PCV13) in adults are needed to assess the impact of adult vaccination with PCV13.
- Available diagnostic tests are limited in their sensitivity for pneumococcal detection.
- We used novel urine antigen detection assays for identification of PCV13 serotypes among adults hospitalized with CAP.
- We noted that some patients received PPV23 (which includes all PCV13 serotypes) early in their hospitalization, occasionally before urine samples were collected for pneumococcal studies.
- We explored the impact of in-hospital PPV23 vaccination on serotype-specific urinary pneumococcal antigen detection results.

METHODS

- Data from the CDC Etiology of Pneumonia in the Community (EPIC) study were used.
- Adults hospitalized with CAP at five hospitals in Chicago, IL and Nashville, TN; 2010-2012. Diagnostic samples were collected and tested for etiology. Vaccination history was self-reported and confirmed through records review, when feasible.
- Archived urine aliquots were used for this study.
- Serotype-specific urinary antigen detection (SSUAD) assays used monoclonal antibodies to identify each of the serotypes included in PCV13. SSUAD tests were done by Pfizer Inc.
- We compared SSUAD results from samples collected prior to the date of confirmed in-hospital PPV23 vaccination with SSUAD results from samples collected on the same date or after vaccination

RESULTS

- Urine samples from 2026 adults hospitalized with CAP were available for SSUAD testing. Median age: 58 years (IQR 47–71)
- 230 (11%) had confirmed in-hospital vaccination
- In serial samples, negative samples became positive after PPV23 vaccination (see examples below)

	Admission	Day 1 after admission	Day 2 after admission	Day 3 after admission	Day 4 after admission	Day 5 after admission	Day 6 after admission	Day 7 after admission	Day 8 after admission
Patient 1	Neg	Neg	Pos (19A)	Pos (19A)	Discharged				
Patient 2	Neg	Neg	Pos (5)	Discharged					
Patient 3	Neg							Pos (5)	Discharged

Detected serotypes	Patients with samples collected before in-hospital vaccination or with unknown vaccination (n=1917)	Patients with samples collected on the date or after in-hospital vaccination (n=109)
At least a PCV13 serotype, % (n)	7%	33%*
Co-detection of serotypes, % (n)	0.4%	8%*
Specific serotypes		
Serotype 5	0.8%	16%*
Co-detection(s) including serotype 5	0.3%	6%*
Serotype 19A	2%	18%*
Co-detection(s) including serotype 19A	0.1%	6%*
Serotype 7F	1%	0%
Co-detection(s) including serotype 7F	0.2%	0%
Serotype 23F	0.9%	1.8%
Co-detection(s) including serotype 23F	0.2%	0%
Serotype 3	1%	2%
Co-detection(s) including serotype 3	<0.1%	0.9%*
All other PCV13 serotypes (1, 4, 6A, 14, 18C, 19F)**	1%	4%*
All serotypes in PCV7	1.7%	4.6%*
Co-detection(s) including PCV7 serotypes	0.3%	2.8%*

*p<0.05 comparing detections between groups; ** no 6B, 9V detections

CONCLUSION

- Our observations suggest that PPV23 vaccination can cause false positive detections of pneumococcal serotypes in urine samples tested through SSUAD assays, favoring the preferential detection of certain serotypes.