Influenza Infection in the Department of Veterans Affairs (VA): 2014-2015

Patricia Schirmer MD, Cynthia Luxon-Ostuen MD, Mark Winters MD, Russell Ryono PharmD, Ginea Ocis MS, Mark Holody MD

Introduction

The VA Healthcare Associated Infection and Influenza Surveillance System (HAISS) includes the use of two surveillance systems - QC PathFinder™ (Vexas Technologies, Inc.) and VA ESSENCE (Johns Hopkins University Applied Physics Laboratory). Using HAISS, VA conducts ongoing influenza surveillance including influenza-like illness (ILI) visits, influenza-coded encounters, admissions and nurse triage calls, influenza laboratory testing, and antiviral/over-thecounter medication administrations. In addition, VA's Public Health Reference Laboratory performs molecular testing on influenza samples received from VA facilities nationwide.

Influenza is associated with significant annual mortality and mortality and VA's large elderly population is at risk. Herein we describe 2014-2015 national influenza activity in VA.

Methods

Percent ILI influenza hospitalizations and deaths; telephone triage; arrival usage; and laboratory testing from 9/28/2014 - 9/1/2015 were obtained using VA HAISS and Corporate Data Warehouse, and compared to 4 previous seasons. Influenza vaccines were captured starting 8/1/2014. A convenience sample of positive nasopharyngeal specimens from 10 VA facilities utilizing hemagglutinin (HA) and neuraminidase (NA) gene population sequencing. HA sequences were compared to the 2015-2016 vaccine strains.

Table 1: Selected VA Influenza Surveillance Metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>2013 N</th>
<th>2014 N</th>
<th>2015 N</th>
<th>2016 N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza-related hospitalizations</td>
<td>635</td>
<td>522</td>
<td>2094</td>
<td>2264</td>
</tr>
<tr>
<td>Deaths</td>
<td>25</td>
<td>23</td>
<td>71</td>
<td>74</td>
</tr>
<tr>
<td>Positive influenza lab*</td>
<td>1948</td>
<td>1458</td>
<td>1400</td>
<td>1147</td>
</tr>
<tr>
<td>Influenza tests performed</td>
<td>19008</td>
<td>18558</td>
<td>19069</td>
<td>16551</td>
</tr>
<tr>
<td>Positive influenza lab†</td>
<td>551</td>
<td>205</td>
<td>1435</td>
<td>1063</td>
</tr>
<tr>
<td>Influenza vaccine</td>
<td>1484</td>
<td>1500</td>
<td>1500</td>
<td>1436</td>
</tr>
<tr>
<td>ILI visits</td>
<td>10067</td>
<td>10305</td>
<td>12897</td>
<td>12447</td>
</tr>
<tr>
<td>Total visits</td>
<td>14841</td>
<td>16666</td>
<td>20447</td>
<td>18317</td>
</tr>
<tr>
<td>Positive ILI</td>
<td>428</td>
<td>274</td>
<td>117</td>
<td>102</td>
</tr>
<tr>
<td>Positive influenza lab‡</td>
<td>353</td>
<td>117</td>
<td>50</td>
<td>45</td>
</tr>
</tbody>
</table>

Results

- Starting August 1, 2014, 1,799,589 patient influenza vaccinations were recorded in the outpatient and inpatient settings representing approximately 27% of 6.6 million patients treated in Fiscal Year 2014 (down from 1.9 million recorded in 2013-2014 season)
- Influenza activity was increased in the 2014-2015 season compared to 2013-2014 across the VA based on the number of influenza hospitalizations, percentage of ILI outpatient visits, influenza-related telephone calls, influenza testing and number/proportion of positive influenza laboratory results primarily due to increased number of cases in patients 65yo and older. (Table 1 and Figure 1)
- The total number of VA laboratory confirmed cases (based on available electronic data) total number tested for influenza for the 2014-2015 flu season: 11,450/186,113 (17%)
  - Overall for the season, 79% of positive tests were influenza A, 20% were influenza B, and 1% were influenza A/M or not specified.
  - The highest number of lab-confirmed flu tests were seen in Texas (1,008), Florida (661), Illinois (603), Ohio (587), California (594) and New York (539) (Figure 2)
- The total number of influenza-coded hospitalizations for the 2014-2015 flu season: 3,704
  - 614 (17%) had an intensive care unit (ICU) admission; 148 (4%) were mechanically ventilated; 117 (3%) died during their hospitalization.
- Median age of influenza hospitalizations was 75 years old and 72% of influenza hospitalizations were in patients aged 65.
- Median length of stay was 4 days.
- We obtained 649 HA and NA sequences. Compared to vaccine strains, amino acid changes were found in at least one epitope of the HA gene in all strains (Figure 3).
- Of 820 influenza strains tested last year: 1 (0.1%) was positive for oseltamivir-resistant associated mutations.

Conclusions

- Further evaluate influenza positive patients and hospitalized patients for immunization status.
- Continuing to work on improving vaccination rates in the veteran population.

Future Directions

- KDO-8 codons were utilized for identifying ILI visits and influenza hospitalization and not all were based on lab-confirmed cases.
- Vaccination data is based on procedure codes rather than immunization or pharmacy data.
- Vaccination data does not include patient vaccinations to non-VA settings.
- Unable to obtain and sequence all positive influenza specimens.

Limitations

- KDO-8 codons were utilized for identifying ILI visits and influenza hospitalization and not all were based on lab-confirmed cases.
- Vaccination data is based on procedure codes rather than immunization or pharmacy data.
- Vaccination data does not include patient vaccinations to non-VA settings.
- Unable to obtain and sequence all positive influenza specimens.

Figure 1. Comparison of Key VA Influenza Indicators by Season

Figure 2. Positive Influenza Laboratory Results by State of Residence

Figure 3. Variability in Influenza HA Epitope. The hemagglutinin (HA) genes for 2014-2015 VA patient influenza strains were analyzed by Sanger sequencing. The sequences of known antibody neutralization epitopes from these strains are shown as compared to the 2014-2015 vaccine strains. In addition to the consensus sequences from 2013-2014 VA patient strains, * indicates same as vaccine sequence, ... indicates non-epitope sequence hidden.