

Feedback from operational stakeholders who manage or respond to outbreaks is that they are often too busy to review literature or obtain relevant background information to assist them with acute response. Unlike a traditional analytical outbreak investigation report, **Watching Briefs** are intended as a rapid resource for public health or other first responders in the field on topical, serious or current outbreaks, and provide a digest of relevant information including key features of an outbreak, comparison with past outbreaks and a literature review. They can be completed by responders to an outbreak, or by anyone interested in or following an outbreak using public or open source data, including news reports.

Watching brief	
<b>Title</b>	Outbreak of Influenza A, H3N2v, in the United States of America, 2022
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<b>Date of first report of the outbreak</b>	02 August 2022 (1)
<b>Disease or outbreak</b>	Influenza A H3N2 strain, H3N2v (1)
<b>Origin (country, city, region)</b>	Jackson County, West Virginia, USA (2)
<b>Suspected Source (specify food source, zoonotic or human origin or other)</b>	Contact with infected pig in swine farm/agricultural fair.(2) Few confirmed cases do not have documented contact with pigs. Human to human transmission might have contributed to these cases (3).
<b>Date of outbreak beginning</b>	02 August 2022 (2)
<b>Date outbreak declared over</b>	Ongoing as on 25 October 2022 (4)
<b>Affected countries &amp; regions</b>	Three confirmed cases of H3N2v have been reported from West Virginia and one case from Michigan in the 2022 Flu season( 5). However, all the USA is reporting a spike in influenza cases in this 2022 season with Influenza A being the predominant variant involved(4).

<p><b>Number of cases (specify at what date if ongoing)</b></p>	<p>As of 25 October 2022, there are four confirmed cases of H3N2v in the 2022 flu season(4). Public health laboratory surveillance in the USA has identified 299 Influenza A cases in the 2022 season, 194 of which belong to the H3 lineage.</p> <p>In a typical Influenza season, typing for viruses among sick individuals occur only among hospitalized patients. As such, any increase in variant virus transmission is also first recorded as an increase in influenza cases in general.</p> <p>There is also an upward trend in hospitalization of influenza cases across the USA with the 65+ age group having higher hospitalization rates. In addition, the number of overall laboratory confirmed influenza cases is increasing, more severely in the 65+ aged group (6).</p> <p>Public health authorities across the USA reported overall attack rate of influenza A to be over 43% (7).</p>
<p><b>Clinical features</b></p>	<p>Fever, cough, sore throat, runny nose, body ache, headache and fatigue are the most common symptoms (8). Some people may report vomiting and diarrhea (8). Fever may not be present in every case (9).</p>
<p><b>Mode of transmission (dominant mode and other documented modes)</b></p>	<p>Primarily, the virus is transmitted from infected pigs/swine to human beings (8). Human to human transmission is rare (8).</p> <p>Spread of flu viruses between pigs and people occur in three ways. First, when an infected pig (or person) coughs or sneezes, droplets containing viruses spread through the air (8). If these droplets land in the nose or mouth, or are inhaled by another person or pig, infection can result. There also is evidence that variant flu viruses can spread by droplet and fomite transmission. A third method of possible transmission is via aerosol transmission (8).</p> <p>Of the confirmed cases of influenza reported in 2021-2022, 78% confirmed a history of contact with a swine and 58% reported to have attended an agricultural event (3).</p>

<p><b>Demographics of cases</b></p>	<p>The four H3N2v cases reported in the 2022 influenza season were among males (3). Information on age-group of affected persons was not available.</p> <p>Of the cumulative confirmed Influenza A cases in the US, 77% were &lt;18 years age, 23% ≥18 years and 62% males (10). Overall, clinical attack rate was highest (40%) among children aged 10 to 14 years (10).</p>
<p><b>Case fatality rate (CFR)</b></p>	<p>The currently ongoing flu season hasn't reported any deaths from H3N2v(11). The case fatality is 0%.</p> <p>In 2021-22 season, the case fatality due to Influenza A was 2.2% (n= 114) (12).</p>
<p><b>Complications</b></p>	<p>Complications of H3N2v influenza is similar to that of seasonal influenza. Most people will recover in a few days to less than two weeks (13). Complications range from sinus &amp; ear infections to pneumonia, myocarditis, encephalitis and multiorgan failure including sepsis.</p> <p>Influenza can also worsen existing chronic health conditions, people who are immunosuppressed by age, by infections like HIV or on immunosuppressive drugs, or by disease conditions including asthma or chronic heart disease, neurological and neurodevelopmental conditions (14). In 2021-22 flu season, the 5.2% of cases required mechanical ventilation (12).</p>
<p><b>Available prevention</b></p>	<p>Quadrivalent/trivalent influenza vaccine is the best way to prevent outbreaks(15). Two doses are recommended for those between 6 months to 8 years age and single dose thereafter (15).</p> <p>Individuals belonging to the high risk category i.e., aged &lt;5 years or &gt;65 years, pregnant women, and chronic medical conditions, should avoid contact with pigs and swine barns, as they are at higher risk of complications of flu (15).</p> <p>For those who are healthy, it's suggested to avoid close contact with pigs that look or are behaving strangely (15). For those who have occupational contact with pigs, it is recommended that they use personal protective equipment if the pig appears unwell. If there is a pig living in the home or farm, its suggested to monitor for illness and seek assistance if any illness is suspected. For individuals with flu symptoms, it is suggested to avoid contact with pigs or wait for 7 days from illness commencement or until fever has been resolved for 24 hours without the use of fever-reducing medications (whichever is longer) (15).</p>

<p><b>Available treatment</b></p>	<p>Antiviral drugs for influenza are the best treatment options available(16). They work best when started early in the disease process and can reduce the duration of illness by 1 or 2 days and prevent complications, like pneumonia (16).</p> <p>For persons at higher risk of serious flu complications, treatment with antiviral drugs can reduce disease severity (16). There are four FDA-approved antiviral drugs recommended by the CDC for influenza-oseltamivir phosphate, zanamivir, peramivir, and baloxavir marboxil (16).</p>																										
<p><b>Comparison with past outbreaks</b></p>	<div data-bbox="486 761 1356 1411" data-label="Figure"> <table border="1"> <caption>Confirmed cases of Influenza A (H3N2v), United States of America, 2011-2022</caption> <thead> <tr> <th>Year</th> <th>Number of cases</th> </tr> </thead> <tbody> <tr><td>2011</td><td>12</td></tr> <tr><td>2012</td><td>309</td></tr> <tr><td>2013</td><td>19</td></tr> <tr><td>2014</td><td>3</td></tr> <tr><td>2015</td><td>3</td></tr> <tr><td>2016</td><td>18</td></tr> <tr><td>2017</td><td>62</td></tr> <tr><td>2018</td><td>1</td></tr> <tr><td>2019</td><td>0</td></tr> <tr><td>2020</td><td>1</td></tr> <tr><td>2021</td><td>3</td></tr> <tr><td>2022</td><td>4</td></tr> </tbody> </table> </div> <p>Figure 1: Confirmed cases of H3N2v, United States of America, 2011-2022 (4)</p> <p>According to data from the Centers for Disease Control and Prevention (Figure 1), reports of influenza-like cases from provider sites this year are higher than the 2020-2021 season and is on an increasing trend since October 2022 but is still much lower than the two seasons prior to the pandemic, the year 2017 and 2016. While we observed an increasing hospitalization trend for this season since October 2022, the age group with the lowest hospitalization rates were among the 18-49 year group (4.2/100,000 population) and highest among &gt;65years of age (18.6/100,000 population) (12).</p> <p>The proportion of outpatient visits for respiratory illness reported by the US ILI surveillance network has occurred earlier in the season (i.e., from 48 to 40 weeks) compared to all flu seasons since 2017-2018 (12). Also, when compared to the years from 2019 to 2021, the proportion of deaths attributable to influenza A has increased (12).</p> <p>The percent of hospitalizations associated with influenza in Massachusetts is 0.89%, according to department of public health, which is higher than last season and the 2019-2020 season, but lower than the 2018-2019 season.</p>	Year	Number of cases	2011	12	2012	309	2013	19	2014	3	2015	3	2016	18	2017	62	2018	1	2019	0	2020	1	2021	3	2022	4
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<p><b>Unusual features</b></p>	<p>All four of the reported cases recovered uneventfully and without unusual clinical features (11).</p> <p>However, the outbreak has been reported earlier than usual in the 2022 season. Usually, seasonal influenza begins in October and peaks by January-February. This season, new cases began in August 2022 and are on an upward trend by October 2022 (11). Vaccination rates, effectiveness of the year's flu vaccine for the specific season and level of herd immunity (17) might have contributed to earlier reporting of seasonal influenza in general and influenza A H3N2 variant in particular. Further, it is suggested that the changing length of seasons and average temperatures are leading to longer flu seasons (17).</p>
<p><b>Critical analysis</b></p>	<p>The H3N2v has undergone antigenic change at a much higher rate than influenza A(H1N1) viruses (5). Frequent changes to the hemagglutinin protein have allowed H3N2v to evade human immune response (16). This may be contributing to frequent outbreaks among pigs and consequently to humans.</p> <p>Further, H3N2v disproportionately impacts older adults(18). Persons aged 65 years and older have a higher rate of comorbidities that increase their risk for serious complications. Increasing hospitalization rates in this age group might be due to waning immunity and reduced protection from vaccines (18).</p> <p>Since the emergence of H3N2v, the virus has resulted in significant morbidity and mortality during seasonal influenza epidemics (10). Compared to influenza A (H1N1) and B viruses, H3N2v has continued to adapt to evade host immunity causing a higher number of hospitalizations and deaths. Effective vaccines and therapies are available, but improvement in public health measures to arrest transmission are needed to prevent further outbreaks (10).</p>
<p><b>Key questions</b></p>	<ol style="list-style-type: none"> <li>1. What additional infection control measures can be implemented to prevent transmission of H3N2v variant virus from pigs to humans? Is there the possibility of vaccination of pigs to prevent infection?</li> <li>2. Is the currently available influenza vaccine effective against the circulating H3N2v?</li> <li>3. Is there an antigenic shift that is associated with increasing disease severity or evasion of immune system?</li> <li>4. Are there additional reasons not already discussed in this report for earlier reporting of the outbreak than usual?</li> </ol>
<p><b>Acknowledgements</b></p>	<p>This Watching Brief is an output of an epidemiology workshop between The National Institute of Epidemiology and EPIWATCH.</p>

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