Surveillance of influenza and other respiratory viruses in the UK

Winter 2019 to 2020
About Public Health England

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Contents

Glossary 4
Executive summary 5
Background 7
Community surveillance 9
Primary care consultations 22
Secondary care surveillance 28
Microbiological surveillance 39
Mortality Surveillance 51
Vaccination 55
Emerging respiratory viruses 64
Conclusions 67
Acknowledgments 69
Glossary

ARI  Acute respiratory infections
COVID-19  Coronavirus Disease 2019
ECDC  European Centre for Disease Control
ECMO  ExtraCorporeal Membrane Oxygenation
ECOSS  Electronic Communication of Surveillance in Scotland
ED  Emergency department
EDSSS  Emergency Department Syndromic Surveillance System
GP  General Practitioner
GPIH  GP in hours
GPOOH  GP out-of-hours
HA  Haemagglutinin
HDU  High Dependency Unit
HI  Haemagglutination inhibition
hMPV  Human metopneumovirus
HPS  Health Protection Scotland
ICU  Intensive Care Unit
ILI  Influenza-like illness
LA  Local Authority
LAIV  Live attenuated influenza Vaccine
MEM  Moving Epidemic Method
MERS-CoV  Middle East Syndrome coronavirus
MOSA  Medical Officers of Schools Association
NI  Neuraminidase inhibitor
NIS  National Infection Service
ONS  Office for National Statistics
PCR  Polymerase chain reaction
PHA  Public Health Agency of Northern Ireland
PHE  Public Health England
POCT  Point of care testing
QIVc  Cell-based quadrivalent influenza vaccine
QIVe  Egg-based quadrivalent influenza vaccine
RCGP  Royal College of General Practitioners
RSV  Respiratory Syncytial Virus
RVU  Respiratory Virus Unit
SARS-CoV-2  Severe acute respiratory syndrome coronavirus 2
SMN  Specialist Microbiology Network
SRF  Severe Respiratory Failure
TIV-HD  High-dose trivalent influenza vaccine
UCL  University College London
USISS  UK Severe Influenza Surveillance Systems
WHO  World Health Organization
Executive summary

In the 2019 to 2020 season, low levels of influenza activity were observed in the community with circulation of influenza A(H3N2) dominating the season. Activity started to increase from week 47, 2019, with the length and peak of activity in general practice varying across the UK, reaching low levels in England, and medium levels in Scotland, Northern Ireland and Wales.

Influenza transmission resulted in medium impact through secondary care indicators (hospitalisations and ICU/HDU admissions). Peak admission rates of influenza to hospital and ICU/HDU were similar or lower than seen in the 2018 to 2019 and 2017 to 2018 seasons but higher than all other seasons since 2010 to 2011.

Excess all-cause mortality was seen during the influenza season in England, Scotland, Wales and Northern Ireland before the circulation of Severe Acute Respiratory Syndrome coronavirus- 2 (SARS-CoV-2) in the UK. From week 12, 2020 levels of excess all-cause mortality were the highest seen in England since excess all-cause mortality began reporting, which coincides with the Coronavirus Disease 2019 (COVID-19) pandemic.

The UK, as with many Northern Hemisphere countries, found that the majority of circulating influenza A(H1N1)pdm09 and A(H3N2) strains that were characterised were genetically and antigenically similar to the Northern Hemisphere 2019 to 2020 A(H1N1)pdm09 and A(H3N2) vaccine virus strains.

Vaccine uptake in England varied by cohort. For the following cohorts, the vaccine uptake in England in the 2019 to 2020 season was higher than the 2018 to 2019 season:
- those aged 65+ (72.4% compared to 72.0% in 2018 to 2019)
- health care workers (74.3% compared to 70.3% in 2018 to 2019)

For the following cohorts, the vaccine uptake in England in the 2019 to 2020 season was lower than the 2018 to 2019 season:
- those aged 6 months to under 65 years of age with 1 or more underlying clinical risk factors (44.9% compared to 48.0% in 2018 to 2019)
- pregnant women (43.7% compared to 45.2% in 2018 to 2019)

In 2019 to 2020, the universal childhood influenza vaccine programme with live attenuated influenza vaccine (LAIV) was again offered to pre-school children aged 2 and 3 years across the UK, plus 4 year olds in Scotland and Northern Ireland. LAIV was offered to all primary school age children across the UK. This was the first year that LAIV was offered to children in Year 6 in England. Vaccine uptake varied across the UK.
In England:
- uptake in 2 and 3 year olds was 43.8%, compared to 44.9% in the previous season
- uptake in primary school age children uptake was 60.4% for all year groups (Reception to Year 6) – this is compared to an uptake of 60.8% in the previous season (Reception to Year 5)
- uptake in each school year group was the same or higher than in the previous season

In Scotland:
- uptake in the 2 to <5 year olds (not yet in school) was 52.5%, compared to 55.8% in the previous season
- uptake in primary school children was 71.3%, compared to 72.9% in the previous season

In Northern Ireland:
- uptake in the 2 to <5 year olds (not yet in school) was 48.5%, compared to 47.6% in the previous season
- uptake in all primary school children was 75.4%, compared to 75.9% in the previous season

In Wales:
- uptake in 2 and 3 year olds was 50.7%, compared to 49.4% in the previous season
- uptake in all primary school children was 69.9%, compared to 69.9% in the previous season

Overall influenza vaccine effectiveness in 2019 to 2020 against a laboratory confirmed infection resulting in a primary care consultation was 42.7% (95% CI 27.8% to 54.5%).

Activity from other circulating seasonal respiratory viruses was similar overall compared to levels reported in recent years with lower levels of Respiratory Syncytial Virus (RSV) seen than in previous seasons in England.

The novel respiratory coronavirus SARS-CoV-2 which causes the disease Coronavirus Disease 2019 (COVID-19) emerged in Wuhan, China in December 2019. The first cases in the UK were confirmed in late January 2020. COVID-19 surveillance in the UK has been ongoing since January 2020.

Two novel respiratory viruses which emerged in 2012 to 2013, Middle East Respiratory Syndrome coronavirus (MERS-CoV) in the Middle East and avian-origin influenza A(H7N9) in Eastern China, have continued to result in human cases in affected countries. Surveillance and public health measures established in the UK for travellers returning with severe respiratory disease from affected countries are on-going.
Background

Surveillance of influenza and other respiratory viruses in the United Kingdom (UK) is undertaken throughout the year and collated on behalf of the countries of the UK by the Influenza Surveillance Team at Public Health England’s National Infection Service (PHE NIS). This is in collaboration with teams within PHE, Health Protection Scotland\(^1\), Public Health Wales\(^2\) and the Northern Ireland Public Health Agency\(^3\), who are each responsible for monitoring influenza surveillance for their respective countries. Weekly outputs are normally published during the winter season between October (week 40) and May (week 20) the period when influenza typically circulates\(^4\). In the 2019 to 2020 season, reports were published weekly between week 40, 2019 and week 9 2020 and fortnightly thereafter. A variety of data sources are collated to provide information on circulating influenza strains (including antigenic and genetic characterisation) and antiviral resistance and the timing of influenza activity and to provide rapid estimates of influenza-related burden within the community, on the health service and in excess all-cause mortality. In addition, in-season and end-of-season monitoring of seasonal influenza vaccine uptake and vaccine effectiveness is undertaken.

Background information on the data sources covered in this report has been previously described\(^5\). The Moving Epidemic Method (MEM)\(^6\) is used by the European Centre for Disease Prevention and Control (ECDC) to standardise reporting of influenza activity across Europe. It has been adopted by the UK and is publicly presented for GP influenza-like illness (ILI) consultation rates for each UK scheme, for the proportion of samples positive for influenza through the respiratory DataMart scheme and for the hospitalisation and intensive care unit (ICU) admissions rate in the UK Severe Influenza Surveillance System (USISS) sentinel and mandatory schemes.

During the 2019 to 2020 season, the roll-out of the licensed live attenuated influenza vaccine (LAIV) has continued and has been completed for children of primary school age across the UK. In England, LAIV was offered to all 2 and 3 year olds through primary care and to children of school age Reception, Year 1, Year 2, Year 3, Year 4, Year 5 and Year 6 (4 to 10 rising to 11 year olds) through schools this year. This is the first influenza season in England where Year 6 have been offered vaccination through

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\(^1\) Health Protection Scotland. www.hps.scot.nhs.uk/a-to-z-of-topics/influenza/
\(^3\) Public Health Northern Ireland. www.publichealth.hscni.net/directorate-public-health/health-protection/influenza
the schools’ programme, meaning that from the 2019 to 2020 season all children of primary school age are eligible.

Additional influenza vaccination activity for children was also carried out with strategies varying by country of the UK. In England and Wales, 2 and 3 year olds were offered in primary care and in Scotland and Northern Ireland, vaccination was offered to 2 to <5 year olds (not yet in school). Vaccination was offered to all primary school children in the UK.

The 2019 to 2020 season also saw the roll-out of a newly licensed cell-based quadrivalent influenza vaccine (QIVc) and the availability of a newly licensed high-dose trivalent influenza vaccine (TIV-HD).

PHE also carries out surveillance for novel respiratory viruses, including Middle East Respiratory Syndrome Coronavirus (MERS-CoV) which was first recognised in September 2012, human infection with avian influenza such as influenza A(H7N9) which emerged in Eastern China in 2013; influenza A(H5N1) which emerged in China in 2003 and influenza A(H5N6) which has been seen in China since 2013.

SARS-CoV-2, which causes COVID-19, emerged in China in December 2019. Since December, the virus spread worldwide and a pandemic was declared by the World Health Organisation (WHO) on 11 March 2020. To monitor epidemiological trends in this new and emerging virus, PHE has created new surveillance systems and adapted existing influenza surveillance systems7 and began publishing weekly national COVID-19 surveillance reports from April 2020 (week 17)8. COVID-19 has impacted on various influenza indicators presented in this report, particularly in the latter part of the season. Data presented in this report should therefore be interpreted with caution.

This report describes influenza activity experienced in the UK in the period from week 40, 2019 (week ending 30 September 2019) to week 14, 2020 (week ending 5 April 2020). This includes observations and commentary from the childhood vaccination programme and activity of other seasonal and novel respiratory viruses.

Community surveillance

Syndromic surveillance

In England, national PHE real-time syndromic surveillance systems, including GP in hours (GPIH) consultations and out-of-hours (GPOOH) contacts, emergency department attendances (Emergency Department Syndromic Surveillance System (EDSSS)) and NHS 111 calls\(^9\), monitor a range of indicators sensitive to community influenza activity, for example NHS 111 ‘cold’/flu calls and GP in-hours consultations for influenza-like illness (ILI).

Trends observed after week 10, 2020 through syndromic surveillance systems should be interpreted with caution due to the impact of the COVID-19 pandemic.

COVID-19 caused an increase in the use of ILI codes and other similar codes, particularly in the early stages of circulation in England. This caused a rapid increase in activity in many of the syndromic respiratory indicators, followed by a rapid decrease in rates in some systems as COVID-19 specific codes were introduced into health care IT systems and changes were made to the way potential COVID-19 patients were managed.

During winter 2019 to 2020, syndromic surveillance indicators for GPIH ILI consultations peaked in week 1, 2020 at 16.8 per 100,000 population. Similarly, GPOOH ILI contacts also peaked in week 1, 2020 at 0.82% of all consultations. GPOOH ILI contacts rapidly increased from week 10, 2020, with this increase likely due to potential COVID-19 consultations being coded as ILI.

Syndromic surveillance indicators for GPIH pneumonia consultation rates peaked at 3.1 per 100,000 in week 1, 2020, which was similar to a peak of 2.8 per 100,000 in week 1, 2019 in the previous season.

Syndromic indicators for GPOOH acute respiratory infections (ARI) contacts peaked in week 52, 2019 at 24.5% of consultations, this was similar to the peaks noted in the previous season of 21.9% of consultations in week 52 2018. GPOOH ARI contacts saw a second peak in week 11, 2020 which is likely due to COVID-19 activity (Figure 1).

Figure 1. Weekly all age (a) GP in hours consultations for influenza-like illness (ILI) (b) GP in hours consultations for pneumonia (c) GP out of hours (OOH) contacts for ILI (d) GP out of hours contacts for acute respiratory infections (ARI) for winter 2016 to 2020, England
ARI emergency department (ED) attendances saw a peak during week 52, 2019 at 15.6% of all ED attendances, which is similar to the peak seen in the previous season of 14.0% in week 52 2018. ED attendances for pneumonia saw a peak in week 1, 2020 at 1.29% of total ED attendances, which is similar to the peak of 1.21% in week 1 2018 in the 2018 to 2019 season. ARI and pneumonia as a percentage of total ED attendances both began to rise again in week 11, 2020, however although there was a rise in the total number of ED attendances for ARI there was not for the numbers of pneumonia attendances. This rise in the percentage ARI and pneumonia attendances was largely due to fewer people attending ED during the COVID-19 pandemic, and therefore the denominator used to calculate ARI/pneumonia percentage was smaller resulting in an increase in percentage, rather than a large increase in the number of people attending with ARI or pneumonia. (Figure 2).
Figure 2. Weekly all age (a) Emergency Department Syndromic Surveillance System (EDSSS) acute respiratory infection (ARI) attendances (b) EDSSS pneumonia attendances for winter 2018 to 2020

NHS 111 ‘cold/flu’ calls saw an early peak in week 52, 2019 accounting for 1.5% of total calls. NHS 111 calls attributed to cold/flu began to increase again from week 3, 2020, peaking at 5.3% of calls in week 11, 2020, followed by a large decrease in week 12, 2020. This second peak is likely due to potential COVID-19 calls initially being
triaged using the pre-existing cold/flu clinical NHS 111 pathway, before new triaging pathways for managing potential COVID-19 calls were introduced thereby reducing the number of cold/flu calls received (Figure 3).

**Figure 3. Weekly all age England NHS 111 cold/flu calls for winter 2016 to 2020**

In Scotland, the weekly proportion of all calls to NHS 24 which mention cold/flu, was low throughout the season and peaked during week 11, 2020 at 1.3%. This late peak is likely to coincide with COVID-19 calls being recorded as cold/flu calls. The proportion of cold/flu calls was lower than seen in the previous 2 seasons (Figure 4).

**Figure 4. Proportion of calls for cold/flu (all ages) through NHS 24, Scotland, 2017 to 2020**
In Wales, the weekly proportion of all cold/flu calls made to NHS Direct Wales saw an early peak in week 50, 2019. The weekly proportion of cold/flu calls began to rise from week 3, 2020, reaching a peak in week 10, 2020. This later peak is similar to that seen in NHS 111 in England and NHS 24 in Scotland, and is likely caused by COVID-19 related calls (Figure 5).

Figure 5. Weekly proportions of calls for cold/flu (all ages) to NHS-Direct, Wales, 2016 to 2020

Outbreak reporting

Between week 40, 2019 and week 14, 2020, a total of 3,936 ARI outbreaks in closed settings were reported in the UK. This is a large increase compared to outbreaks occurring in the previous 3 seasons, where the highest had been 2,149 in 2017 to 2018 (Table 1).

Of all outbreaks, 2,751 (69.9%) occurred in care homes, 257 (6.5%) in hospitals, 656 (16.7%) in schools, 126 (3.2%) in prisons and 146 (3.7%) in other settings. This increase is largely attributed to SARS-CoV-2 outbreaks.

An early peak in the number of outbreaks was seen in week 48 2019 with 193 outbreaks. School outbreaks accounted for the majority of outbreaks between weeks 47 and 52 2019 (58.9%). The number of reported outbreaks began to rise again in week 11, 2020, reaching 1,057 outbreaks reported in week 14, 2020. This rise in reported outbreaks late in the season coincides with an increase of SARS-CoV-2 related outbreaks.

Table 1. Number and percentage of UK outbreaks by institution type, 2016 to 2020
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<tbody>
<tr>
<td>Total</td>
<td>3,936</td>
<td>1,432</td>
<td>2,149</td>
<td>1,114</td>
</tr>
<tr>
<td>Institution type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care homes</td>
<td>2,751</td>
<td>1,013</td>
<td>1,700</td>
<td>875</td>
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<tr>
<td>Hospitals</td>
<td>257</td>
<td>206</td>
<td>230</td>
<td>162</td>
</tr>
<tr>
<td>Schools</td>
<td>656</td>
<td>162</td>
<td>160</td>
<td>61</td>
</tr>
<tr>
<td>Prisons</td>
<td>126</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>146</td>
<td>51</td>
<td>59</td>
<td>16</td>
</tr>
</tbody>
</table>

* Date for 2018 to 2019, 2017 to 2018 and 2016 to 2017 is based on week 40 to week 20
* Outbreaks in prisons were counted in other setting for 2018 to 2019, 2017 to 2018 and 2016 to 2017

Where information on virological testing were available, the majority of outbreaks were confirmed as SARS-CoV-2 (1490/2134; 69.8%). There were 19 outbreaks confirmed to be associated with influenza A(H1N1)pdm09 and 25 outbreaks with influenza A(H3N2). 388 outbreaks were confirmed to be associated with influenza A(not subtyped). Twelve outbreaks were associated with influenza B. There were 192 outbreaks confirmed to be associated with a range of other non-influenza viruses including respiratory syncytial virus (RSV), rhinovirus, human metapneumovirus (hMPV), seasonal coronavirus and parainfluenza. Eight outbreaks were associated with multiple respiratory viruses (Figure 6).
Figure 6. Weekly number of outbreaks by (a) institution type and (b) virological test results where available by week of reporting, 2019 to 2020 UK

a) Care home
- Hospital
- School
- Prison
- Other

b) Flu A(H1N1)pdm09
- Flu A(H3N2)
- Flu A(not subtyped)
- Flu B
- SARS-CoV-2
- Other
- Multiple pathogens
In England, a total number of 3,524 ARI outbreaks were reported to PHE between week 40, 2019 and week 14, 2020 compared to 1,300 in the 2018 to 2019 season (week 40 to week 20). The majority of outbreaks were from care home settings (68.5%). School outbreaks accounted for 17.9% of all outbreaks. Hospital outbreaks accounted for 6.6% of outbreaks. Prison outbreaks accounted for 3.3% of outbreaks. Outbreaks in other settings accounted for 3.7% of outbreaks. Regionally, the highest number of outbreaks occurred in the South East region (17.2%) followed by the North West region (15.6%).

In Scotland, the number of ARI outbreaks reported to Health Protection Scotland (HPS) between week 40, 2019 and week 14, 2020 was 192, which is higher than previous seasons (48 in 2018 to 2019, 132 in 2017 to 2018 and 78 in 2016 to 2017). The majority of these outbreaks were reported from care homes (78.6%), followed by schools (9.4%), hospitals (8.9%), prisons (2.1%) and other setting (1.0%). Of the 192 outbreaks reported, 28 were confirmed to be associated with influenza. From those 21 were influenza A(not subtyped), 4 were influenza A(H3N2), 2 were influenza B and 1 was influenza A(H1N1)pdm09. 10 of the outbreak were associated with other seasonal respiratory viruses or tested positive for mixed respiratory pathogens. 50 outbreaks tested positive for SARS-CoV-2, with a further 76 reported as suspected SARS-CoV-2 without a virological test result.

In Wales, there were 167 outbreaks of ARI reported to the Public Health Wales Health Protection teams between week 40, 2019 and week 14, 2020, compared to 62 between week 40 and week 15 during the 2018 to 2019 season. The majority were reported from care homes (83.8%), followed by other setting (6.6%), school and nursery settings (4.2%), prisons (3.0%) and hospitals (2.4%). Virological results were available for 110 confirmed respiratory outbreaks, of which 8 were influenza A(H3N2), 1 was influenza A(H1N1)pdm09, 1 was influenza A(not subtyped) and 100 were SARS-CoV-2.

In Northern Ireland, there were a total of 53 ARI outbreaks reported to the Public Health Agency between week 40, 2019 and week 14, 2020, compared to a total of 19 ARI outbreaks in the 2018 to 19 season and 58 ARI outbreaks in the 2017 to 2018 season. 47 (88.7%) outbreaks were reported from care homes, 4 (7.5%) from hospitals, and 2 (3.8%) from other setting. Virological results were available for 19 confirmed respiratory outbreaks of which 9 were influenza A(not subtyped), 1 was influenza B and 9 were SARS-CoV-2.

Medical Officers of Schools Association (MOSA) and PHE scheme

The Medical Officers of Schools Association (MOSA) was founded in 1884 and involves a network of more than 200 predominantly private and boarding schools around the United Kingdom\textsuperscript{10,11}.

\textsuperscript{11} MOSA website. www.mosa.org.uk/
Following the re-introduction of influenza A(H1N1) in 1978, which spread widely amongst children and younger people, PHE and the Medical Officers of Schools Association (MOSA) developed a surveillance scheme to monitor respiratory illness in children attending MOSA schools in England. Since September 1983, the scheme has formed part of the routine surveillance activities of PHE.

Participating MOSA schools complete a general annual online survey, including questions on influenza vaccine policies for students; weekly surveys reporting how many boarders developed ILI as well as other respiratory related illnesses and a vaccine uptake survey by school year.

In 2019 to 2020, 17 MOSA schools agreed to participate in the scheme. Participating schools included a total of 3,182 boarders, with 97.7% of boarders from secondary schools. Figure 7 represents the weekly ILI rates observed through the scheme this season. ILI rates peaked in week 50, 2019 at 3.5 per 1,000 boarders.

Data for this scheme is only reported up to week 11, 2020, due to the government recommendations of school closures12 due to the COVID-19 pandemic.

Figure 7. Weekly ILI rates per 1,000 boarders observed through participating MOSA schools in England, 2019 to 2020

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Surveillance of influenza and other respiratory viruses in the UK: Winter 2019 to 2020

Flusurvey (internet based surveillance)

Flusurvey is part of a European wide initiative (including 10 European countries) run by Public Health England, providing internet-based surveillance of ILI in the UK population. On registration, individuals aged 18+ complete a baseline questionnaire which collects information on demographic, geographic, socioeconomic (household size and composition, occupation, education, and transportation), and health (vaccination, diet, pregnancy, smoking, and underlying medical conditions) data. Subsequently, participants are sent weekly reminders via email to report any symptoms relating to flu that they may have experienced and their health-seeking behaviour as a result of their symptoms. This creates a fast, reliable and flexible real-time monitoring surveillance system. Participants were recruited during the first 6 weeks of the survey period initiated once influenza activity has been established in the community (week 46 to week 52).

A total of 1,927 participants were recruited of which an average of 1,791 (92.9%) completed at least 1 survey contributing over 41,200 real-time flu related symptoms data.

Characteristics of registered participants varied by age and gender. There were more participants in the 45 to 64 years age group (40.2%) compared to other age groups. There was a higher proportion of female participants compared to male participants (64.8% vs 35.2%). The majority (1,714; 89.4%) of participants were resident in England; 122 participants were from Scotland; 13 participants were from Northern Ireland and 67 from Wales.

Based only on participants who completed 3 or more weekly symptom surveys and using the European Centre for Disease Control (ECDC) ILI case definition of sudden onset of symptoms and at least 1 of; fever, malaise, headache or muscle pain and at least 1 of; cough, sore throat, shortness of breath, the overall number of self-reported ILI cases was 1,049 (2.5%). Self-reported ILI trends showed 3 peaks at week 52, week 1 and week 12 (Figure 8). Further analysis and report of the 2019 to 2020 flu survey will be available on the website in the summer (www.flusurvey.net).

Figure 8. Weekly ILI incidence per 1,000 by age group reported through Flusurvey, 2019 to 2020 UK
Google influenza like illness (ILI) searches (internet-based surveillance)

PHE have been collaborating with University College London (UCL) to assess the use of internet based search queries as a surveillance method for ILI, throughout England. This is part of work on early-warning surveillance systems for influenza, through the Engineering and Physical Sciences Research Council (EPSRC) Interdisciplinary Research Collaboration (IRC) project i-sense\textsuperscript{13}.

Combining natural language processing and machine learning techniques, a non-linear Gaussian process model was developed by UCL\textsuperscript{14,15} to produce real time estimates of ILI. The supervised model, trained on historical data from the Royal College of General Practitioners (RCGP) scheme\textsuperscript{16} (2005 to 2006 to 2016 to 2017 seasons at national level), produces daily ILI estimates based on the proportion of ILI related search queries within a 10\% to 15\% sample of all queries issued, which was extracted daily from Google’s Health Trends Application Programming Interface.

Estimated rates of ILI started to increase in week 47, 2019, before peaking during week 52, 2019, which was a week after than that seen through the RCGP ILI consultation data which peaked in week 51, 2019. The ILI rate also increased later in the season with peaks seen in weeks 06 and 11 2020. These peaks are likely due to COVID-19, and associated media interest, rather than influenza. ILI rates did not reach the peak seen in the 2010 to 2011 season when the influenza A(H1N1)pdm09 pandemic was taking place (Figure 9).

Due to the nature of daily data and its fluctuations in estimating rates based on searches, a 3-day moving average was applied to visualise the underlying trend.

\begin{itemize}
\item \textsuperscript{13} i-sense website. www.i-sense.org.uk/
\item \textsuperscript{15} Lampos V \textit{et al}. Advances in nowcasting influenza-like illness rates using search query logs. Scientific Reports. 2015 3:5. doi:10.1038/srep12760
\item \textsuperscript{16} Royal College of General Practitioners Research and Surveillance Centre: www.rcgp.org.uk/clinical-and-research/our-programmes/research-and-surveillance-centre.aspx
\end{itemize}
Figure 9. Daily estimated ILI Google search query rates (and 3-day moving average) per 100,000 population, 2019 to 2020
Primary care consultations

England

Weekly rates of General Practitioner (GP) consultations for influenza-like illness (ILI) through the Royal College of General Practitioners (RCGP) scheme\(^\text{17}\) increased above the Moving Epidemic Method (MEM) baseline threshold for the 2019 to 2020 season of 12.7 per 100,000 in week 49, 2019 and then peaked in week 51, 2019 at 19.4 per 100,000. Rates remained at or above the threshold for 6 weeks until week 2, 2020 in England. Rates also increased above the MEM baseline threshold in week 11, 2020 before decreasing below the baseline threshold in week 12, 2020 (Figure 10).

The number of weeks where the ILI rate was above baseline threshold in 2019 to 2020 was fewer than that observed in the 2018 to 2019 season (6 weeks vs 8 weeks). The peak activity in 2019 to 2020 was lower and earlier compared to the previous season in 2018 to 2019 (23.1 per 100,000 in week 06 2019). In comparison to the last influenza A(H3N2) dominated season in 2017 to 2018, the peak activity was lower and occurred earlier in the season (19.4 per 100,000 in week 51 in 2019 to 2020 compared to 54.1 per 100,000 in week 3 in 2017 to 2018).

By age group, activity peaked at the highest levels in the <1 year olds (35.8 per 100,000 in week 1, 2020) and 1 to 4 year olds (31.2 per 100,000 in week 51, 2020).

\(^{17}\) Clinical surveillance through primary care.
Figure 10. Weekly all age GP influenza-like illness rates for 2019 to 2020 and past seasons, and peak rates by age group in 2019 to 2020, England (RCGP)
Scotland

Weekly GP consultations for ILI increased above the baseline MEM threshold of 26.7 per 100,000 in week 11, 2020 and peaked in week 12, 2020 at 38.1 per 100,000, which is also above the low MEM threshold of 37.2 per 100,000. Rates dropped below the baseline threshold in week 13, 2020. The COVID-19 lockdown in week 13, 2020 contributed to a reduction in the number of consultations in GP practices (Figure 11).

Overall seasonal ILI activity had lower intensity compared to the last influenza A(H3N2) dominated season in 2017 to 2018 (peak of 113.9 per 100,000 in 2017 to 2018 compared to 38.1 per 100,000 in 2019 to 2020), and ILI activity peaked later in the season (week 12, 2020 compared to week 2, 2018). It is unclear what impact the COVID-19 pandemic had on ILI activity in the latter part of the season.

By age group, the highest levels of activity were seen in 15 to 44 year olds (51.1 per 100,000 in week 12, 2020), 45 to 64 year olds (40.6 per 100,000 in week 12, 2020) and under 1 year olds (36.1 per 100,00 in week 12, 2020).

Figure 11. Weekly all age GP influenza-like illness rates for 2019 to 2020 and past seasons, and peak rates by age group in 2019 to 2020, Scotland
Wales

Weekly GP consultations for ILI in Wales increased above the baseline MEM threshold of 11.1 per 100,000 in week 50, 2019 and peaked in week 52, 2019 at 37.1 per 100,000. Rates remained at or above the baseline threshold for 6 weeks until week 4, 2020 and reached medium intensity levels (Figure 12).

In comparison to the last influenza A(H3N2) dominated season in 2017 to 2018 the peak activity was lower (37.1 per 100,000 in 2019 to 2020 compared to 75.4 per 100,000 in 2017 to 2018). Compared to last season, the peak activity was higher (22.7 per 100,000 in 2018 to 2019).

GP ILI consultations by age group were not available from Wales for the 2019 to 2020 season.
Northern Ireland

Weekly GP consultations for ILI in Northern Ireland increased above the baseline MEM threshold of 14.7 per 100,000 in week 48 2019, peaking at 29.2 per 100,000 in week 49, 2019. Rates reached medium intensity levels. Rates dropped below the baseline MEM threshold of 14.7 per 100,000 in week 52, 2019. Rates increased above the baseline threshold in weeks 01 and 11 2020. This compared to a peak of 65.2 per 100,000 in week 2 in 2017 to 2018, the last influenza A(H3N2) dominated season (Figure 13).

By age group, the highest levels of activity were seen in the 5 to 14 year olds (62.4 per 100,000) and 1 to 4 year olds (42.9 per 100,000) both in week 48 2019 (Figure 13).
Figure 13. Weekly all age GP influenza-like illness rates for 2019 to 2020 and past seasons, and peak rates by age group in 2019 to 2020, Northern Ireland.
Secondary care surveillance

Influenza surveillance in secondary care is carried out through the UK Severe Influenza Surveillance Systems (USISS), which were established after the 2009 influenza pandemic. There are 2 established schemes:

- the USISS sentinel hospital scheme, which is a sentinel network of acute trusts in England who report weekly aggregate numbers on laboratory confirmed influenza hospital admissions at all levels of care
- the USISS mandatory ICU scheme – a national mandatory collection which collects the weekly number of laboratory confirmed influenza cases admitted to Intensive Care Units (ICU) and High Dependency Units (HDU) and number of confirmed influenza deaths in ICU/HDU across the UK

For the 2019 to 2020 season, the MEM method has been applied to the USISS schemes (using the previous 5 seasons’ rates of admission) to calculate thresholds to show the impact of influenza activity throughout the season\(^\text{18}\).

**USISS Sentinel**

Through the USISS sentinel scheme, a total of 4,918 hospitalised confirmed influenza cases (mean weekly incidence of 1.99 per 100,000 trust catchment population) were reported from 22 participating sentinel NHS acute trusts across England from week 40, 2019 to week 14, 2020. This compares to a total of 5,667 cases (mean weekly incidence 1.82 per 100,000 trust catchment population) from 24 participating trusts in 2018 to 2019, 10,107 cases (mean weekly incidence of 3.14 per 100,000 trust catchment population) from 25 participating trusts in 2017 to 2018 and a total of 1,575 cases (mean weekly incidence of 0.77 per 100,000 trust catchment population) from 25 participating trusts in 2016 to 2017 (Figure 14).

The rate of hospital admissions peaked in week 51, 2019 in the medium impact threshold (7.50 per 100,000 trust catchment population). The peak was at a similar level to the previous season (Figure 17).

Amongst cases reported, influenza A(not subtyped) was the dominant subtype reported up to week 14, 2020 (2,825, 57.4%). High number of influenza A(not subtyped) are seen due to testing being completed by rapid point of care testing (POCT) rather than the traditional polymerase chain reaction (PCR) testing, with the proportion of influenza

A (not subtyped) among hospital influenza cases rising in the last number of years (57.4% of cases in 2019/20 compared to 27.4% in 2016 to 2017) as POCT has increased in clinical setting. The highest number of cases was observed in the 65+ year olds (1,796, 36.5%) (Figure 15). The majority of cases aged under 1 year admitted to hospital were under 6 months old (60.3%).

The cumulative rate of influenza admission was highest in the under 5 year olds and in the over 65s for influenza A (not subtyped). For influenza A (H3N2) the age groups with the highest rates were the under 5 year olds (41.2 per 100,000) and the over 65s (27.2 per 100,000) (Figure 16).

**Figure 14. Weekly number of influenza confirmed admissions to hospital through the UK Severe Influenza Surveillance Systems (USISS) sentinel scheme in England, with crude hospitalisation rate, week 40, 2019 to week 14, 2020**
Figure 15. Cumulative influenza confirmed hospital admissions by age group and influenza type, through the UK Severe Influenza Surveillance Systems (USISS) sentinel scheme, week 40, 2019 to week 14, 2020

Figure 16. Cumulative rate of influenza confirmed hospital admissions per 100,000 trust catchment population by age group and influenza type in England, through the UK Severe Influenza Surveillance Systems (USISS) sentinel scheme, week 40, 2019 to week 14, 2020
Figure 17. Weekly number of influenza confirmed hospital admissions to hospital through the UK Severe Influenza Surveillance Systems (USISS) sentinel scheme with crude hospitalisation rate for all ages, 2010 to 2020

USISS Mandatory

Through the USISS mandatory scheme, a total of 1,802 ICU/HDU admissions of confirmed influenza were reported across the UK from week 40, 2019 to week 14, 2020, including 103 deaths, based on combined data from England, Scotland and Northern Ireland.

In England, through the USISS mandatory scheme, the total number of influenza confirmed admissions to ICU/HDU was 1,660 from 141 NHS acute trusts (mean weekly incidence of 0.12 per 100,000 trust population) with 78 influenza deaths in ICU during the same period (Figure 18).

The cumulative number of cases (1,660 cases) was slightly lower compared to the 2018 to 2019 season (3,017 cases) and 2017 to 2018 season (3,245 case) but higher than the 2016 to 2017 season (992 cases) in England (Figure 18). The case fatality rate (proportion of ICU/HDU influenza cases which have died due to influenza) was 4.7% in the 2019 to 2020 season, compared with a case-fatality rate of 9.3% in the 2018 to 2019 season and 10.2% in the 2017 to 2018 season.

ICU/HDU case numbers and admission rates in England peaked in week 51, 2019 with 232 cases observed for that week and a rate of 0.45 per 100,000 in the medium impact threshold (Figure 18). Of the 1,660 ICU/HDU admissions in England, the majority were due to influenza A (1,549; 93.3%), with the remainder due to influenza B (111; 6.7%). Of the influenza A admissions, 1,135 (73.3%) were due to influenza A (not subtyped), 282 (18.2%) were influenza A(H3N2) and 132 (8.5%) were reported to be influenza A(H1N1)pdm09 (Figure 19).
ICU/HDU admissions occurred in all age groups. Those aged 45 to 64 years made up 27.2% of all cases and 19.6% of all cases were seen in the 15 to 44 year olds (Figure 19).

The cumulative rate of influenza admission was highest in all age groups for admissions with influenza A(not subtyped). High number of influenza A(not subtyped) are seen due to testing being completed by rapid POCT rather than the traditional PCR testing. By subtype, the highest rate for influenza A(H1N1)pdm09 was in 65 to 74 year olds (0.57/100,000) and for influenza A(H3N2) was in 75+ year olds (1.70/100,000) (Figure 20). In previous seasons influenza A(H3N2) circulation has coincided with high admissions to secondary care in older age groups.

**Figure 18. Weekly number of influenza confirmed admissions to ICU/HDU through the UK Severe Influenza Surveillance Systems (USISS) mandatory scheme in England, with crude ICU/HDU admission rate, week 40, 2019 to week 14, 2020**
Figure 19. Cumulative ICU/HDU influenza confirmed admissions by age group and influenza type in England, through the UK Severe Influenza Surveillance Systems (USISS) mandatory scheme, week 40, 2019 to week 14, 2020

ICU/HDU admission rates peaked at a lower level than seen in the previous 2 seasons (Figure 21).
Figure 21. Weekly number of influenza confirmed ICU/HDU admissions to hospital in England through the UK Severe Influenza Surveillance Systems (USISS) mandatory scheme with crude hospitalisation rate for all ages, 2011 to 2020 (up to week 14)

In Scotland, there were less laboratory confirmed cases requiring intensive care management (ICU admissions) reported from week 40, 2019 to week 14, 2020 (76 admissions, cumulative rate of 1.39 per 100,000 population) compared to a similar period in 2017 to 2018 (162 admissions, cumulative rate of 3.00 per 100,000 population), the last season influenza A(H3N2) was the dominant virus circulating. In comparison to the 2018 to 2019 season (166 admissions, cumulative rate of 3.06 per 100,000 population) the number of laboratory confirmed cases and rate of ICU admissions was lower in the 2019 to 2020 season. The peak activity was in weeks 52, 2019 and 1, 2020 (12 admission each week). Similar levels of influenza A(H3N2), influenza A(H1N1)pdm09 and influenza A(not subtyped) were seen in ICU, each accounting for between 30% to 33% of admissions. Influenza B accounted for 5.2% of admissions (Figure 22).

The largest number of cases was observed in the 45 to 64 year olds (47.4%) followed by the 65+ year olds (23.7%) and the 15 to 44 year olds (22.4%). No cases were seen in those aged less than 1 year (Figure 22).

The case fatality rate (that is, proportion of ICU influenza cases which have died due to influenza) of 18.4% (14/76) in the 2019 to 2020 season is similar to that seen in the previous season (19.9%, 33/166).
Figure 22. Weekly number of laboratory confirmed influenza ICU cases with crude rate of ICU admissions in Scotland, with crude ICU admission rate up to week 14, 2020 and the cumulative number of ICU admissions by age group and influenza type up to week 14, 2020, Scotland

In Wales, 52 patients (cumulative rate of 1.66 per 100,000 resident population) in ICU were confirmed with influenza between week 40, 2019 and week 14, 2020 with peak activity in week 52, 2019. Influenza A(H3N2) accounted for 59.6% of these confirmed cases and 23.1% were due to influenza A(H1N1)pdm09. Of the patients confirmed with influenza in ICU, 38.5% were aged 45 to 64 and 36.5% were aged 65+ years (Figure 23).
Figure 23. Weekly number of laboratory confirmed influenza ICU cases with crude rate of ICU admissions in Wales and the cumulative proportion of ICU admissions by age group up to week 14, 2019, Wales

In Northern Ireland, there were 66 patients (cumulative rate of 3.48 per 100,000 resident population) in ICU with laboratory confirmed influenza between week 40, 2019 and week 14, 2020, with peak activity in week 49, 2019. Influenza A(H3N2) accounted for the majority (77.3%) of these confirmed cases followed by influenza A(not subtyped) (10.6%). By age group, the highest proportion of cases (37.9%) were in those aged 65+ years (Figure 24). 11 deaths (16.7% of ICU cases) were also reported in the ICU/HDU patients with laboratory confirmed influenza.
Figure 24. Weekly number of laboratory confirmed influenza ICU cases in Northern Ireland and the cumulative number of ICU admissions by age group and influenza type up to week 14, 2020, Northern Ireland.
USISS Severe Respiratory Failure Centre (SRF)

This surveillance system collects data on every patient admitted to a Severe Respiratory Failure (SRF) Centre, for ExtraCorporeal Membrane Oxygenation (ECMO) or other advanced respiratory support, and whether or not the primary cause is known to be infection-related. There are 6 SRFs in the UK (5 in England and 1 in Scotland). For the 2019 to 2020 season, of 205 SRF admissions reported by 6 SRFs between week 40, 2019 and week 14, 2020, 37 (18%) were laboratory confirmed influenza admissions, including 13 influenza A(H1N1)pdm09, 7 influenza A(H3N2) and 14 influenza A(not subtyped) and 3 influenza B. This compares with a total of 96 influenza admissions to SRF centres in 2018 to 2019, where influenza A(H1N1)pdm09 predominated SRF centre admissions throughout early part of the season, followed by influenza A(H3N2) in the latter part. In the previous season (2017 to 2018) where influenza B and A(H3N2) co-circulated in SRF centres, there were 60 influenza admissions to SRF centres. The 2019 to 2020 figure for influenza admissions to SRF centres was also lower compared to the total of 73 influenza confirmed admissions to SRF centres in 2015 to 2016, another recent season where influenza A(H1N1)pdm09 predominated in SRF centres.
Microbiological surveillance

Respiratory DataMart, England

Influenza A and B positivity were monitored through the respiratory DataMart surveillance scheme in England for the season of 2019 to 2020, with the overall influenza positivity increasing above the Moving Epidemic Method (MEM) baseline threshold of 9.7% in week 47, 2019 (Figure 25). Influenza A(H3N2) was the dominant circulating virus in the early part of the 2019 to 2020 season. In the latter part of the season influenza A(H3N2), influenza A(H1N1)pdm09 and influenza B, all circulated at low levels.

Overall influenza positivity peaked at 25.3% in week 52, 2019, with the majority of positive samples associated with influenza A. Influenza A positivity peaked in the same week at 24.6%. Influenza A(H3N2) positivity also peaked in week 52, 2019 at 18.0%, and was higher than the peak seen in the 2017 to 2018 season when influenza A(H3N2) peaked 8.7% positivity in week 52 2017. The highest age-specific positivity of A(H3N2) was in the 5 to 14 year olds at 32.3% in week 49, 2019. The number of influenza B detections remained at very low levels throughout the season with overall positivity peaking in weeks 9 and 10, 2019 at 1.9%. The number of influenza A(H1N1)pdm09 detections also remained low throughout the season with overall positivity peaking in week 2, 2020 at 1.9% (Figure 26).

Figure 25. Weekly number of influenza A and B detections through Respiratory Datamart in England, with overall % positivity, 2019 to 2020
Figure 26. Weekly number of influenza detections by subtype through Respiratory Datamart in England, with overall % positivity, 2010 to 2020
ECOSS, Scotland

In Scotland, overall influenza positivity reported through non-sentinel sources reported via Electronic Communication of Surveillance in Scotland (ECOSS) rose above the MEM baseline threshold of 7.4\% in week 47, 2019, and reached a peak of 36.6\% in week 52, 2019. As seen elsewhere in the UK, influenza A(H3N2) was the dominant circulating virus in Scotland, peaking in week 51, 2019 (Figure 27).

Figure 27. Weekly ECOSS influenza positivity (number and percentage positive) by influenza subtype from week 40, 2019 to week 14, 2020, Scotland

Sentinel GP-based swabbing scheme

GP-based sentinel swabbing schemes in the UK were dominated by influenza A(H3N2) in line with observations from other influenza surveillance schemes (Figure 28).

In England, influenza activity through the RCGP/Specialist Microbiology Network (SMN) schemes increased from week 47, 2019 and remained above 20.0\% positivity until week 3, 2020. Overall influenza positivity peaked at 44.0\% in week 51, 2020 (Figure 28).

Influenza activity monitored through the GP Sentinel Scheme in Scotland peaked at 65.6\% positivity in week 52, 2019 with influenza A(H3N2) accounting for the majority of positive specimens (Figure 28).
In Wales, the majority of influenza positive specimens were influenza A(H3N2) with the peak number of positive specimens seen in week 50, 2019 (Figure 28).

In Northern Ireland, the peak number of influenza positive specimens was seen in week 50, 2019 and was mainly due to influenza A(H3N2) (Figure 28).

**Figure 28. Weekly number of influenza positive sentinel virology samples by influenza type, % positive and ILI rate, 2019 to 2020, UK**
Virus characterisation

PHE characterises the properties of influenza viruses through 1 or more tests, including genome sequencing (genetic analysis) and hemagglutination inhibition (HI) assays (antigenic analysis). These data are used to compare how similar the currently

*NB: Positivity suppressed for Wales and Northern Ireland due to small weekly sample numbers.*
circulating influenza viruses are to the strains included in seasonal influenza vaccines, and to monitor for changes in circulating influenza viruses. The interpretation of genetic and antigenic data sources is complex due to several factors, for example, not all viruses can be cultivated in sufficient quantity for antigenic characterisation, so that viruses with sequence information may not be able to be antigenically characterised as well. Occasionally, this can lead to a biased view of the properties of circulating viruses, as the viruses which can be recovered and analysed antigenically, may not be fully representative of majority variants, and genetic characterisation data does not always predict the antigenic characterisation.

The PHE Respiratory Virus Unit (RVU) has characterised 1,008 influenza A(H3N2) viruses detected from week 40, 2019 to week 14, 2020. Genetic characterisation of 951 of these shows that 755 belong to the genetic clade 3C.3a, and 196 fall into a cluster within the 3C.2a1 subclade, designated 3C.2a1b. The Northern Hemisphere 2019/20 influenza A(H3N2) vaccine strain belongs in genetic subclade 3C.3a. A total of 568 A(H3N2) viruses have been antigenically characterised and are similar to the A/Kansas/14/2017-like Northern Hemisphere 2019/20 (H3N2) vaccine strain. Difficulties remain with detection and typing of A(H3N2) viruses by HI assays due to observed receptor binding changes, particularly with viruses from the 3C.2a1 subclade and these are under-represented in the antigenic characterisation data.

A total of 81 A(H1N1)pdm09 viruses have been genetically characterised to date and all fall in clade 6B.1A, as does the A(H1N1)pdm09 N. Hemisphere 2019/20 vaccine strain. Eighty-two A(H1N1)pdm09 viruses have been antigenically characterised and are similar to the A/Brisbane/02/2018-like N. Hemisphere 2019/20 A(H1N1)pdm09 vaccine strain.

50 influenza B viruses have been characterised to date, where sequencing of the haemagglutinin (HA) gene shows these viruses belong in genetic clade 1A of the B/Victoria lineage, clustering in a subgroup within this clade characterised by deletion of 3 amino acids in the HA. One influenza B virus has been characterised genetically as belonging to genetic clade 3 of the B/Yamagata lineage. The N. Hemisphere 2019/20 B/Victoria-lineage quadrivalent and trivalent vaccine component virus (a B/Colorado/06/2017-like virus) belongs in genetic clade 1A, clustering in a subgroup with 2 deletions in the HA. Forty-two influenza B viruses have been antigenically characterised. Thirty-five (83%) are antigenically similar to B/Colorado/06/2017-like N. Hemisphere 2019/20 B/Victoria vaccine strain, and all 42 (100%) are closely related antigenically to the recommended 2020/21 season B/Victoria vaccine strain (B/Washington/02/2019).
Table 2. Viruses characterised by the PHE Reference Laboratory, from week 40, 2019 to week 14, 2020

<table>
<thead>
<tr>
<th>Virus</th>
<th>No. viruses characterised</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Genetic and antigenic</td>
</tr>
<tr>
<td>A(H1N1)pdm09</td>
<td>39</td>
</tr>
<tr>
<td>A(H3N2) 3C.2a1</td>
<td>0</td>
</tr>
<tr>
<td>A(H3N2) 3C.3a</td>
<td>511</td>
</tr>
<tr>
<td>A(H3N2) Total</td>
<td>511</td>
</tr>
<tr>
<td>B/Yamagata-lineage</td>
<td>0</td>
</tr>
<tr>
<td>B/Victoria-lineage</td>
<td>21</td>
</tr>
</tbody>
</table>

Antiviral resistance

Neuraminidase inhibitor (NI) susceptibility (oseltamivir and zanamivir) is determined by phenotypic testing of virus isolates and genotypic testing of clinical samples positive for influenza A(H1N1)pdm09, A(H3N2), and influenza B viruses at the PHE RVU. Two other laboratories also perform screening for the H275Y amino acid substitution in influenza A(H1N1)pdm09 positive clinical samples. The data summarized below combine the results of both RVU and these other laboratories, with resistant cases reported if confirmed by RVU. The samples tested are routinely obtained for surveillance purposes, but diagnostic testing of patients not responding to NI treatment is also performed.

Between week 40, 2019 and week 14, 2020, oseltamivir susceptibility had been determined for 917 influenza A(H3N2) viruses. All but 6 were susceptible. 906 also tested for zanamivir susceptibility, all but 2 were susceptible.

106 influenza A(H1N1)pdm09 viruses have been tested for oseltamivir susceptibility and all were fully susceptible. Of the 106 influenza A(H1N1)pdm09 viruses, 81 have also been tested for zanamivir susceptibility and all were susceptible.

All of the 43 influenza B viruses tested for both oseltamivir and zanamivir susceptibility were fully susceptible.

Respiratory syncytial virus (RSV)

Respiratory syncytial virus (RSV) reported through DataMart Surveillance system peaked in week 49, 2019 at 13.4% positivity, with circulation above 10.0% between week 47, 2019 and week 1, 2020 (Figure 29). This peak was observed around the same
time as the peaks seen in the last 3 seasons however positivity was lower than in previous seasons, 13.4% in 2019 to 2020 compared to 21.5% in 2018 to 2019 peaking in week 48, 20.9% in 2017 to 2018 peaking in week 48 2017 and 24.7% in 2016 to 2017 peaking in week 47 2016. The highest positivity was seen in children aged less than 5 year of age, with a peak of 38.1% in week 50, 2019, which is lower than the peak in the 2018 to 2019 season of 47.3% in week 48, 2018. The lowest age-specific peak positivity was noted in the 15 to 44 year olds, with a peak of 5.2% in week 2 2019.

Figure 29. RSV number of positive samples and positivity (%) by week in Respiratory Datamart, 2016 to 2020, England

The overall Royal College of General Practitioners (RCGP) GP acute bronchitis rate peaked at 107.4 per 100,000 in week 1, 2020. The rate in under 1 year olds had a first peak in the same week as RSV positivity in week 49, 2019 at 309.1 per 100,000, and had a second peak in week 8, 2020 at 323.0 per 100,000. This is low compared to the previous season with a peak rate in the under 1 year olds of 939.2 per 100,000 in week 48, 2018. The rate in 1 to 4 year olds peaked in week 48 2019 at 228.1 per 100,000 and had a second peak in week 6, 2020 at 151.2 per 100,000. The rate for 75+ year olds peaked in the same week as the overall rate (week 1, 2020) at 379.90 per 100,000, similar to the previous season (Figure 30).
Figure 30. Weekly acute bronchitis consultation rates overall, in under 1 year olds, 1 to 4 year olds and 75+ year olds with RSV positivity (%) through the RCGP scheme, 2019 to 2020, England

As part of a WHO initiative to pilot RSV surveillance\textsuperscript{19}, England has continued monitoring and collating data on confirmed hospitalised RSV cases through the USISS sentinel scheme in 2019 to 2020. This is the third year of the surveillance designed to form a baseline before the introduction of an RSV vaccine in the future.

Between week 40, 2019 and week 14, 2020, a total of 3,053 confirmed RSV cases (2,903 hospitalised to lower level of care and 150 admitted to ICU/HDU) were reported from 16 participating trusts. The rate of hospital admission (lower level of care) due to RSV peaked in week 51, 2019 at 5.3 per 100,000 trust catchment population, appearing slightly later than the peaks in previous 2 seasons (Figure 31). The highest rate (for hospitalisations to lower level of care) was among patients aged <5 years, peaking in week 51, 2019 at 50.4 per 100,000 trust catchment population.

The highest number of confirmed RSV cases were in those aged <1 year which accounted for 46% (1331/2903) of total lower level care admissions for RSV and 64% (96/150) of total ICU/HDU admissions for RSV (Figure 32). In the 2019 to 2020 season data collection for the <1 year group was split into <6 and 6 to 11 months and commenced from week 44, 2019. Based on data from week 44, 2019 to week 14, 2020, of infants aged <1 year hospitalised for RSV (lower level of care), 74% (941/1,268) were aged <6 months. Of infants aged <1 year admitted to ICU/HDU for confirmed RSV, 86% (82/95) were aged <6 months.

\textsuperscript{19} WHO RSV surveillance. www.who.int/influenza/rsv/en
Surveillance of influenza and other respiratory viruses in the UK: Winter 2019 to 2020

In Scotland, RSV was the most commonly detected non-influenza pathogen (4,727 detections, 34.0% positive samples) detected through non-sentinel sources (ECOSS) for the 2019 to 2020 season (up to week 14, 2019).

In Wales, 10,302 hospital and non-sentinel GP samples were routinely tested for a panel of respiratory viruses with an additional 640 samples were tested only for influenza and RSV (using a rapid test system). 369 of 10,942 samples tested positive for RSV (3.4% of positive samples),
Other seasonal respiratory viruses

Of the other respiratory viruses monitored through the respiratory DataMart system, the highest activity was seen with rhinovirus throughout the season. Rhinovirus activity was highest at the beginning of the season with activity being slightly lower during the winter months when influenza was circulating.

Parainfluenza activity was highest early in the season with activity declining steadily throughout the season. Human metapneumovirus (hMPV) activity slowly increased around week 44, 2019 to week 52, 2019 where levels remained stable until week 11, 2020 when a decrease in percent positivity was observed. Consistent with previous seasons, low levels of adenovirus were observed throughout the season with no clear seasonality seen (Figure 33).

**Figure 33. Weekly number of positive samples and proportion positive for other respiratory viruses, 2018 to 2020**
In Scotland, the pattern of non-influenza respiratory pathogens detected through ECOSS for 2019 to 2020 season (up to week 14, 2020), was similar to that seen in the previous 2 seasons (2017 to 2018 and 2018 to 2019). Rhinovirus was the second most common non-influenza pathogen (4,490 detections, 32.4% positive samples), after RSV, followed by adenovirus (1,651 detections, 11.9% positive samples) and coronavirus (excluding SARS-CoV-2) (1,042 detections, 7.5% positive samples). The other non-influenza pathogens (parainfluenza, hMPV and Mycoplasma pneumoniae) were detected in a lower proportion of positive samples (5.4%, 5.5% and 3.1%, respectively).

In Wales, 10,302 hospital and non-sentinel GP samples were routinely tested for: influenza, RSV, adenovirus, Mycoplasma pneumoniae, rhinovirus, parainfluenza, enterovirus and hMPV. The 2 most commonly detected non-influenza respiratory pathogens were rhinovirus (1,521 detections, 14.8% positive samples) and human metapneumovirus (538 detections, 5.2% positive samples). Other detected causes of respiratory infection included: adenovirus (4.6%), parainfluenza (3.1%), enterovirus (2.9%) and Mycoplasma pneumoniae (1.7%).
Mortality Surveillance

Excess all-cause mortality surveillance

Excess mortality is defined as a significant number of deaths reported over that expected for a given point in the year based on historical patterns, allowing for weekly variation in the number of deaths.

The UK uses the European monitoring of excess mortality (EuroMOMO) algorithm to estimate weekly all-cause excess mortality\textsuperscript{20}. This algorithm allows for direct comparison between excess mortality estimates in the countries of the UK. The number of deaths by date of death is corrected by reporting delay and excess determined by week of death, avoiding the impact of bank holidays.

During 2019 to 2020, up to week 14, 2019, excess mortality was seen in England in all ages in weeks 44, 47, 49 to 2 and 12 to 14. In the early part of the season, the total number of observed deaths was lower than in the 2017 to 2018 season, the last season where A(H3N2) was the dominant subtype. Excess mortality in England was seen in week 12 to 14 in line with increases in deaths related to the COVID-19 pandemic (Figure 34). Significant excess mortality was seen in 5 to 14 year olds in week 46, 15 to 64 year olds in weeks 1 to 2 and 12 to 14 and in 65 plus year olds in weeks 44, 47, 49 to 2 and 12 to 14 (Table 3).

Figure 34. Weekly observed and expected number of all-age all-cause deaths, with the dominant circulating strain type(s), England, 2015 to 2020

\textsuperscript{20} EuroMOMO. www.euromomo.eu
Across the devolved administrations of the UK, modelled estimates using the EuroMOMO model showed significant excess in all ages for Scotland, Wales and Northern Ireland. By age group, excess was seen in the under 5 year olds, 15 to 64 year olds and 65 plus year olds in Wales, Scotland and Northern Ireland (Table 3).

**Table 3. Weeks with excess mortality observed in 2019 to 2020 (up to week 14) in the UK**

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Weeks with excess in 2019 to 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>England</td>
</tr>
<tr>
<td>All ages</td>
<td>44; 47; 49 to 2; 12;14</td>
</tr>
<tr>
<td></td>
<td>Wales</td>
</tr>
<tr>
<td></td>
<td>51; 01; 13 to 14</td>
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<tr>
<td></td>
<td>Scotland</td>
</tr>
<tr>
<td></td>
<td>41; 46; 49 to 51; 1</td>
</tr>
<tr>
<td></td>
<td>1 to 2; 13 to 14</td>
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<tr>
<td></td>
<td>Northern Ireland</td>
</tr>
<tr>
<td></td>
<td>50 to 51; 03; 13 to 14</td>
</tr>
<tr>
<td>&lt;5</td>
<td>-</td>
</tr>
<tr>
<td>5 to 14</td>
<td>46</td>
</tr>
<tr>
<td>15 to 64</td>
<td>1 to 2; 12 to 14</td>
</tr>
<tr>
<td>65+</td>
<td>41; 44; 46-47; 49 to 2; 12 to 14</td>
</tr>
<tr>
<td></td>
<td>51 to 1; 13 to 14</td>
</tr>
<tr>
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<tr>
<td></td>
<td>2; 13 to 14</td>
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<tr>
<td></td>
<td>49 to 14</td>
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<td></td>
<td>49 to 51; 14</td>
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</tbody>
</table>

**Paediatric mortality**

Fatal case reports from local health protection teams and the Office for National Statistics (ONS) were received for influenza-related deaths in children in England.

Provisional data shows that during the 2019 to 2020 winter influenza season between week 40, 2019 and up to 18 April 2020, 25 influenza-related fatal cases were reported in children aged between 0 to 17 years. There were 14 female and 11 male cases. 22 of the 25 cases had influenza A infection (including 1 influenza A(H1N1)pdm09, 10 influenza A(H3) and 11 influenza A(not subtyped)) and the remaining 3 cases had influenza B infection.

Information available shows that underlying medical conditions were reported from 13 of the 25 cases. Information on influenza vaccination history during the 2019 to 2020 season for these fatal cases showed that 2 cases had the influenza vaccination and 2 cases had not had the influenza vaccination according to their GP records. The other cases’ influenza vaccination information was not available.
Influenza-attributable deaths

The FluMOMO model is an extension of the EuroMOMO algorithm which aims to estimate the excess number of deaths associated with influenza activity, adjusting for extreme temperature. Similar to the EuroMOMO model, it is a standardised model which can be applied across countries and has been used previously in England to estimate such deaths.

Figure 35 represents the weekly number of all-age deaths and attribution to influenza and extreme temperature. Due to the potential impact of the COVID-19 pandemic, the analysis has been modelled up to week 9, 2020 (a week prior to the first COVID-19 death in the UK).

The majority of all-age deaths were attributed to influenza, with few deaths attributed to extreme temperature. All-age deaths attributed to influenza were less than in the last influenza A(H3N2) dominated season which was the 2017 to 2018 season. (Figure 35 and Table 4).

Figure 35. Weekly number of all-age deaths and attribution to influenza (red line) and extreme temperature (green line), England, 2015 to 2020 (up to week 9 2020)

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21 FluMOMO. https://euromomo.eu/how-it-works/methods/
Table 4. Number of deaths associated with influenza observed through the FluMOMO algorithm with confidence intervals, England, 2015 to 2016 season to 2019 to 2020 (up to week 9, 2020)

<table>
<thead>
<tr>
<th>Season</th>
<th>All ages</th>
<th>0-4 years</th>
<th>5-14 years</th>
<th>15-64 years</th>
<th>65+ years</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/16</td>
<td>7,371</td>
<td>30</td>
<td>8</td>
<td>619</td>
<td>6,048</td>
</tr>
<tr>
<td></td>
<td>(6,918 to 7,834)</td>
<td>(22 to 39)</td>
<td>(4 to 13)</td>
<td>(549 to 692)</td>
<td>(5,640 to 6,465)</td>
</tr>
<tr>
<td>2016/17</td>
<td>15,047</td>
<td>48</td>
<td>15</td>
<td>366</td>
<td>13,480</td>
</tr>
<tr>
<td></td>
<td>(14,462 to 15,639)</td>
<td>(39 to 57)</td>
<td>(9 to 21)</td>
<td>(321 to 411)</td>
<td>(12,936 to 14,031)</td>
</tr>
<tr>
<td>2017/18</td>
<td>22,087</td>
<td>13</td>
<td>4</td>
<td>1,365</td>
<td>19,525</td>
</tr>
<tr>
<td></td>
<td>(21,336 to 22,794)</td>
<td>(8 to 18)</td>
<td>(1 to 8)</td>
<td>(1,277 to 1,454)</td>
<td>(18,878 to 20,180)</td>
</tr>
<tr>
<td>2018/19</td>
<td>3,966</td>
<td>63</td>
<td>3</td>
<td>322</td>
<td>2,939</td>
</tr>
<tr>
<td></td>
<td>(3,597 to 4,347)</td>
<td>(52 to 75)</td>
<td>(1 to 7)</td>
<td>(270 to 376)</td>
<td>(2,625 to 3,285)</td>
</tr>
<tr>
<td>2019/20*</td>
<td>7,990</td>
<td>55</td>
<td>10</td>
<td>534</td>
<td>6,405</td>
</tr>
<tr>
<td></td>
<td>(7,489 to 8,502)</td>
<td>(43 to 68)</td>
<td>(4 to 17)</td>
<td>(469 to 604)</td>
<td>(6,451 to 7,369)</td>
</tr>
</tbody>
</table>

*Data up to week 9, 2020
Vaccination

Seasonal influenza vaccine uptake in adults

Although, all countries of the UK use standardised specifications to extract uptake data from IT information systems in primary care, there are some differences in extraction specifications, so comparisons should be made cautiously.

In England, the uptake of seasonal influenza vaccine is monitored by PHE throughout the season based upon weekly and monthly extracts from GP information systems via ImmForm23 for the cohorts primarily delivered via the GP practice.

Cumulative uptake on influenza vaccinations administered up to 28 February 2020 was reported from 99.3% (6,678/6,723) of GP practices in England in 2019 to 2020. Comparative data are up to 28 February 2019 where uptake was reported from 97.2% (6,716/6,910) of GP practices in England in 2018 to 2019. This season saw a vaccine uptake of 72.4% in 65+ year olds (compared to 72.0% in 2018 to 2019) and 44.9% for those aged 6 months to under 65 years of age with 1 or more underlying clinical risk factors (excluding pregnant women without other risk factors and carers), compared to 48.0% in 2018 to 2019 (Table 3). Uptake in pregnant women was 43.7%, compared to 45.2% in 2018 to 2019. The more detailed final uptake reports are now publicly available24.

In Scotland, the uptake of seasonal influenza vaccine is estimated by Health Protection Scotland (HPS) throughout the season, also based on automated 4-weekly extracts from >95% of all Scottish GP practices. As such, vaccine uptake reported here should be regarded as provisional. Cumulative uptake in 2019 to 2020 to week 15 2020 showed vaccine uptake of 74.0% in 65+ year olds (compared to 73.7% in 2018 to 2019). Uptake amongst those aged 6 months to under 65 year olds in 1 or more clinical at-risk groups was 42.3% (compared to 42.4% in 2018 to 2019). Overall uptake in pregnant women (including those with and without other risk factors) up to week 15 2020 was 44.4%, compared to 45.7% in 2018 to 2019. The uptake in pregnant women (without other risk factors) was 42.9%, compared with 44.5% in 2018 to 2019. The uptake in pregnant women (with other risk factors) was 56.9%, compared with 57.5% in 2018 to 2019.

In Wales, the uptake of seasonal influenza vaccine is monitored on a weekly basis by Public Health Wales throughout the season based on automated weekly extracts of Read coded data using software installed in all General Practices in Wales collected through the Audit+ Data Quality System. Cumulative uptake data on influenza

23 ImmForm website https://portal.immform.phe.gov.uk/
24 Vaccine Uptake – Influenza vaccine uptake reports. www.gov.uk/government/collections/vaccine-uptake#seasonal-flu-vaccine-uptake:-figures
vaccinations administered were received from 100% of GP practices in Wales in 2019 to 2020. This showed a vaccine uptake of 69.4% in 65+ year olds (compared to 68.3% in 2018 to 2019) and 44.1% for those aged 6 months to under 65 years of age with 1 or more underlying clinical risk factors (excluding morbidly obese patients without other risk factors), compared to 47.1% in 2018 to 2019. Overall uptake in pregnant women was 78.5% compared to 74.2% in 2018 to 2019. In Wales, vaccine coverage in pregnant women is measured differently using a survey of pregnant women giving birth each year during January. In addition, as elsewhere in the UK, data are also automatically collected from general practices for women with pregnancy related Read-codes, these data report uptakes of 60.6% in pregnant women at risk and 46.0% in healthy pregnant women.

In Northern Ireland, the uptake of seasonal influenza vaccine is monitored by the Public Health Agency (PHA) of Northern Ireland. Cumulative uptake of influenza vaccination administered up to 31 March 2020 was reported from 99.1% of GP practices in Northern Ireland in 2019 to 2020. In the population aged 65+ years uptake was 74.8% (compared to 70.0% in 2018 to 2019) and in the population of under 65 years at risk the uptake was 58.9% (compared to 52.4% in 2018 to 2019). Uptake in pregnant women was 46.3% compared to 44.3% in 2018 to 2019.

Uptake by frontline healthcare workers in England was 74.3% from 98.7% of organisations, an increase from 70.3% in 2018 to 2019. In Scotland, provisional uptake figures in healthcare workers across all territorial health boards was 53.8%; this compares with 51.2% in 2018 to 2019. In Wales, uptake reached 58.7% compared to 55.5% in 2018 to 2019. In Northern Ireland, uptake in frontline healthcare workers including social care was 36.8% compared to 35.4% in 2018 to 2019. Uptake for healthcare workers excluding social care was 41.2% in 2019 to 2020.

Table 5 summarises uptake in adults in the UK.
Table 5. Influenza vaccine uptake in 65+ year olds, 6 months to under 65 years at risk, pregnant women and healthcare workers, 2019 to 2020, UK

<table>
<thead>
<tr>
<th>Target group</th>
<th>England</th>
<th>Scotland</th>
<th>Northern Ireland</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number vaccinated</td>
<td>Denominator</td>
<td>% uptake</td>
<td>Number vaccinated</td>
</tr>
<tr>
<td>65+ years</td>
<td>7,621,505</td>
<td>10,523,854</td>
<td>72.4</td>
<td>787,766</td>
</tr>
<tr>
<td>6 months to under 65 years at risk</td>
<td>3,182,752</td>
<td>7,086,331</td>
<td>44.9</td>
<td>331,162</td>
</tr>
<tr>
<td>Pregnant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No risk</td>
<td>242,024</td>
<td>574,918</td>
<td>42.1</td>
<td>14,962</td>
</tr>
<tr>
<td>At risk*</td>
<td>40,068</td>
<td>70,367</td>
<td>56.9</td>
<td>2,300</td>
</tr>
<tr>
<td>All</td>
<td>282,092</td>
<td>645,285</td>
<td>43.7</td>
<td>17,262</td>
</tr>
<tr>
<td>Healthcare workers**</td>
<td>791,112</td>
<td>1,065,017</td>
<td>74.3</td>
<td>81,550</td>
</tr>
</tbody>
</table>

* The pregnant women at risk are already included in our <65 years at risk category
** Excluding social care workers
Influenza vaccine (LAIV) programme for children

England

The influenza vaccine uptake in 2 and 3-year olds in primary care in England is monitored by PHE throughout the season based upon weekly and monthly extracts from GP information systems via ImmForm for the cohorts primarily delivered via the GP practice.

Cumulative uptake on influenza vaccinations administered up to 28 February 2020 was reported from 99.3% (6,673/6,720) of GP practices in England in 2019 to 2020. Comparative data are up to 28 February 2019 where uptake was reported from 96.2% (6,645/6,909) of GP practices in England in 2018 to 2019. This season saw a vaccine uptake of for all GP-registered 2 year olds of 43.4% (compared to 43.8% in 2018 to 2019) and was 44.2% in 3 year olds (compared to 45.9% in 2018 to 2019) in England. The combined uptake for 2 and 3 year olds was 43.8% compared to 44.9% in 2018 to 2019.

In the 2019 to 2020 season, the influenza vaccine programme for primary school children was extended to include children in Year 6 (aged 10 rising to 11 years old), and thus included all children of primary school age (4 to 11 years old) for the first time. The programme was mainly delivered via a school-based route, although one area delivered vaccinations through general practice. Vaccine uptake was monitored through manual returns by local teams for their responsible population. There were no pilot areas this season.

An estimated 2,876,531 children in school years Reception, 1, 2, 3, 4, 5 and 6 in England received at least 1 dose of influenza vaccine during the period 1 September 2019 to 31 January 2020. With an estimated total target population of 4,764,192; the overall uptake was 60.4%. Total uptake in children in Reception and school years 1, 2, 3, 4, 5 and 6 was 64.3%, 63.6%, 62.6%, 60.6%, 59.6%, 57.2% and 55.0%, respectively. Uptake in years 1 to 5 was the same or higher than seen in the 2018 to 2019 season. For the third consecutive year, there was an overall pattern of decreasing uptake with increasing age (Figure 36).
Uptake by local NHS England Team ranged from 50.3% in London to 69.0% in the Hampshire, Isle of Wight and Thames Valley team (Table 6). Overall uptake for children in school years’ Reception, 1, 2, 3, 4, 5 and 6 combined by Local Authority (LA) (not shown here) ranged from 29.5% (7,054/23,875) in Tower Hamlets to 81.9% (20,102/24,557) in East Riding. Uptake by year group and LA ranged from:

- 34.0% to 88.1% in Reception
- 34.1% to 85.5% in Year 1
- 33.6% to 83.2% in Year 2
- 31.1% to 81.6% in Year 3
- 29.0% to 80.4% in Year 4
- 23.9% to 78.3% in Year 5
- 21.2% to 77.8% in Year 6
Table 6. Estimated number and proportion of children of school years Reception, 1, 2, 3, 4, 5 and 6 age who were vaccinated with influenza vaccine by local NHS England team from 1 September 2019 to 31 January 2020*

<table>
<thead>
<tr>
<th>Local NHS England team</th>
<th>No. of children eligible for vaccination</th>
<th>No. of children vaccinated with at least 1 dose of influenza vaccine</th>
<th>Vaccine uptake (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>754,417</td>
<td>379,634</td>
<td>50.3</td>
</tr>
<tr>
<td>London</td>
<td>754,417</td>
<td>379,634</td>
<td>50.3</td>
</tr>
<tr>
<td>Midlands</td>
<td>1,110,618</td>
<td>679,064</td>
<td>61.1</td>
</tr>
<tr>
<td>Central Midlands</td>
<td>421,522</td>
<td>260,088</td>
<td>61.7</td>
</tr>
<tr>
<td>North Midlands</td>
<td>298,540</td>
<td>184,603</td>
<td>61.8</td>
</tr>
<tr>
<td>West Midlands</td>
<td>390,556</td>
<td>234,373</td>
<td>60.0</td>
</tr>
<tr>
<td>East of England</td>
<td>358,980</td>
<td>217,363</td>
<td>60.6</td>
</tr>
<tr>
<td>East of England</td>
<td>358,980</td>
<td>217,363</td>
<td>60.6</td>
</tr>
<tr>
<td>North West</td>
<td>598,228</td>
<td>372,550</td>
<td>62.3</td>
</tr>
<tr>
<td>Cheshire and Merseyside</td>
<td>204,711</td>
<td>135,335</td>
<td>66.1</td>
</tr>
<tr>
<td>Greater Manchester</td>
<td>264,319</td>
<td>158,742</td>
<td>60.1</td>
</tr>
<tr>
<td>Lancashire and South Cumbria</td>
<td>129,198</td>
<td>78,473</td>
<td>60.7</td>
</tr>
<tr>
<td>North East</td>
<td>735,191</td>
<td>455,957</td>
<td>62.0</td>
</tr>
<tr>
<td>Cumbria and North East</td>
<td>252,693</td>
<td>161,627</td>
<td>64.0</td>
</tr>
<tr>
<td>Yorkshire and Humber</td>
<td>482,498</td>
<td>294,330</td>
<td>61.0</td>
</tr>
<tr>
<td>South East</td>
<td>757,946</td>
<td>486,655</td>
<td>64.2</td>
</tr>
<tr>
<td>Hampshire, Isle of Wight and Thames Valley</td>
<td>352,552</td>
<td>243,361</td>
<td>69.0</td>
</tr>
<tr>
<td>Kent, Surrey and Sussex</td>
<td>405,394</td>
<td>243,294</td>
<td>60.0</td>
</tr>
<tr>
<td>South West</td>
<td>448,812</td>
<td>285,308</td>
<td>63.6</td>
</tr>
<tr>
<td>South West North</td>
<td>210,968</td>
<td>142,007</td>
<td>67.3</td>
</tr>
<tr>
<td>South West South</td>
<td>237,844</td>
<td>143,301</td>
<td>60.2</td>
</tr>
<tr>
<td>Total</td>
<td>4,764,192</td>
<td>2,876,531</td>
<td>60.4</td>
</tr>
</tbody>
</table>

* Data for Bassetlaw, an LA district of Nottinghamshire UA, was collected independently. Bassetlaw uptake figures are reported under Yorkshire and Humber NHS England team.

A more detailed PHE report on influenza vaccine uptake in England in primary school age children is publicly available\(^{25}\).

Scotland

The estimated uptake in preschool children (2 to under 5 year olds, not yet in school) vaccinated in the GP setting was 52.5% in 2019 to 2020 (compared to 55.8% in 2018 to 2019).

\(^{25}\) Vaccine Uptake – Influenza vaccine uptake reports. [www.gov.uk/government/collections/vaccine-uptake#seasonal-flu-vaccine-uptake-figures](www.gov.uk/government/collections/vaccine-uptake#seasonal-flu-vaccine-uptake-figures)
In 2019 to 2020, the offer of influenza vaccine was made to all primary school aged children in Scotland with an estimated 292,619 children aged 4 to 11 years who received at least 1 dose of influenza vaccine. With an estimated total target population for the school based programme of 410,624, this resulted in an uptake of 71.3% at the end of the season. This is similar to the vaccine uptake achieved during the primary school programme in 2018 to 2019 (301,943 children vaccinated out of a target population of 414,086, resulting in an 72.9% uptake). These uptake figures are based on aggregate school level data collated in season and are likely to be an underestimate, as the estimated uptake from some NHS boards does not include data from additional children vaccinated in general practice.

Reported uptake of the primary school programme varied by NHS board (Figure 37).

**Figure 37. Mean influenza vaccine uptake (%) by NHS board, with confidence intervals [CI] for the primary schools in 2019 to 2020 to week 15 2020, compared to the previous season**

![Image of Figure 37](image)

* *For the majority of NHS health board, the uptake includes data obtained from general practices on the number of children vaccinated in schools.

**NHS Health boards include: Ayrshire and Arran (AA), Borders (BR), Dumfries and Galloway (DG), Fife (FF), Forth Valley (FV), Greater Glasgow and Clyde (GGC), Grampian (GR), Highland (HG), Lanarkshire (LN), Lothian (LO), Orkney (OR), Shetland (SH), Tayside (TY), Western Isles (WI).

**Wales**

In Wales, immunisations for 2 and 3 year olds were delivered through general practices, apart from one health board where the majority of 3 year olds were immunised through nursery school immunisations sessions (uptake in these nursery school sessions was 66.3%). National uptake of influenza vaccine in 2 and 3 year olds increased in 2019 to 2020. Uptake of influenza vaccine for children aged 2 years was 49.3% (compared to 50.4% in 2018 to 2019), for 3 year olds it was 52.1% (compared to 48.3% in 2018 to 2019). For the whole group of children aged 2 and 3 years, uptake was 50.7% (compared to 49.4% in 2018 to 2019).
The childhood influenza programme in Wales includes all primary school children. Uptake in school children remained stable. Children aged 4, 5, 6, 7, 8, 9 and 10 years, received their vaccinations in school immunisation sessions and uptake was 71.7%, 71.6%, 71.5%, 69.9%, 69.6%, 68.0% and 67.2% in each of these groups respectively. For the group, uptake was 69.9% (compared to 69.9% in 2018 to 2019).

Northern Ireland

In 2019 to 2020 the childhood influenza vaccination programme continued to include all pre-school children aged 2 to 4 years old and all primary school aged children. The former group were offered vaccination through primary care, with the latter group offered vaccination through school health teams. The vaccination uptake rate in 2019 to 2020 for pre-school children aged 2 to 4 years old was 48.5% (compared to 47.6% in 2018 to 2019). The vaccination uptake rate for children in primary school (aged approximately 4 to 11 years old) was 75.4% (compared to 75.9% in 2018 to 2019).

Vaccine effectiveness

Influenza vaccine effectiveness (VE) in adults and children in primary care in the United Kingdom (UK): provisional end-of-season results 2019 to 2020

The UK is in the seventh season of introducing a universal childhood influenza vaccine programme and the second season of introducing a newly licensed adjuvanted influenza vaccine (aTIV) for those aged 65+ years. The 2019 to 2020 season also saw the introduction of a newly licensed cell-based quadrivalent influenza vaccine (QIVc). A newly licensed high-dose trivalent influenza vaccine (TIV-HD) was also available, though this was not reimbursable by NHS E&I.

As in previous seasons, influenza vaccine effectiveness (VE) was measured using a test-negative case control design through 5 primary care influenza sentinel swabbing surveillance schemes in England (2 schemes), Scotland, Wales and Northern Ireland adjusting for key confounders (aVE).

There were 3,510 controls and 1,008 cases of whom 123 were due to A(H1N1)pdm09 and 744 were A(H3N2). The provisional end-of-season aVE was 42.7% (95% CI: 27.8, 54.5) against all laboratory-confirmed influenza; 53.5% (95% CI: 20.1%, 72.9%) against influenza A(H1N1)pdm09 and 31.2% (95% CI: 10.3%, 47.2%) against A(H3N2). Overall aVE was 22.7% (95%CI: -38.5%, 56.9%) for all 65+ year olds and 16.2% (95% CI: -58.7%, 55.7%) for those who received aTIV. Overall aVE for 2 to 17 year olds receiving LAIV was 45.4% (95% CI: 12.6%, 65.9%) (Table 5).

There is evidence of overall significant influenza VE in 2019/20, most notably against influenza A(H1N1)pdm09, but as seen in the past 2 seasons, there was reduced VE
against A(H3N2). The new QIVc vaccine provided significant protection for those in the 18 to 64 year of age and non-significant protection in the 65+ year olds. The point estimates for VE against influenza A(H3N2) in 18 to 64 year olds for QIVc was notably higher than for QIVe, though confidence intervals overlapped.

Table 7: Adjusted influenza vaccine effectiveness (VE) against medically-attended laboratory confirmed influenza by age group and influenza type in 2019/20, UK

<table>
<thead>
<tr>
<th>Group</th>
<th>A(H3N2) adjusted VE(%) (95% CI)</th>
<th>A(H1N1)pdm09 adjusted VE(%) (95% CI)</th>
<th>All adjusted VE (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 17 years olds (LAIV only)</td>
<td>30.5 (-18.5, 59.2)</td>
<td>NA</td>
<td>45.4 (12.6, 65.9)</td>
</tr>
<tr>
<td>18 to 64 year olds (any vaccine)</td>
<td>41.2 (12.9, 60.3)</td>
<td>54.3 (8.9, 77.1)</td>
<td>48.6 (28.2, 63.2)</td>
</tr>
<tr>
<td>18 to 64 year olds (QIVc)</td>
<td>64.8 (12.4, 85.8)</td>
<td>NA</td>
<td>63.9 (26.9, 82.2)</td>
</tr>
<tr>
<td>18 to 64 years olds (QIVe)</td>
<td>28.7 (-28.4, 60.5)</td>
<td>NA</td>
<td>38.9 (-4.5, 64.3)</td>
</tr>
<tr>
<td>65+ year olds (any vaccine)</td>
<td>9.7 (-69.5, 51.8)</td>
<td>68.6 (-36.9, 92.8)</td>
<td>22.7 (-38.5, 56.9)</td>
</tr>
<tr>
<td>65+ year olds (aTIV)</td>
<td>8.6 (-81.9, 54.1)</td>
<td>NA</td>
<td>16.2 (-58.7, 55.7)</td>
</tr>
<tr>
<td>65+ year olds (QIVc)</td>
<td>NA</td>
<td>NA</td>
<td>31.7 (-81.5, 74.3)</td>
</tr>
<tr>
<td>All ages</td>
<td>31.2 (10.3, 47.2)</td>
<td>53.5 (20.1, 72.9)</td>
<td>42.7 (27.8, 54.5)</td>
</tr>
</tbody>
</table>

CI: confidence interval; VE: vaccine effectiveness; NA: not applicable

* Adjusted for age group, sex, month, risk-group, pilot area and surveillance scheme
Emerging respiratory viruses

Middle East Respiratory Syndrome coronavirus (MERS-CoV) infections

Since WHO first reported cases of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in September 2012, a total of 2,519 laboratory confirmed cases have been reported globally up to the end of January 2020 in 27 countries. This includes at least 866 fatal cases (case fatality ratio of 34.3%)\textsuperscript{26}. Most cases have either occurred in the Middle East or have direct links to a primary case infected in the Middle East. A feature of MERS-CoV, is its ability to cause large outbreaks within healthcare settings. Local secondary transmission following importation has been reported from several countries including the UK, France, Tunisia and the Republic of Korea.

MERS-CoV infection was originally confirmed in 4 cases with 2 imported cases to the UK detected in September 2012 and January 2013, respectively. The 2 secondary cases with non-sustained transmission in the UK were linked to the second imported UK case in January 2013.

PHE continues to monitor potential cases in travellers returning from the Middle East with severe respiratory disease, with individuals tested for MERS-CoV if they meet the suspect case definition. One positive case has been reported in the UK since February 2013, the imported case was confirmed to have MERS-CoV infection in 23 August 2018. No onward transmission was detected amongst their close contacts. This brings the total number of positive cases seen in the UK to 5. However, in April and May 2014, 2 laboratory confirmed cases transited through London Heathrow Airport on separate flights to the USA. Contact tracing of flight contacts did not identify any further cases. Since the start of the MERS-CoV global outbreak up to 13 May 2020, 1,815 suspected cases amongst returning travellers have been identified in the UK and tested negative for MERS-CoV.

PHE remains vigilant, closely monitoring developments in countries where new cases emerge and continues to liaise with international colleagues to assess whether recommendations need to change in relation to MERS-CoV. The risk of infection to UK residents in the UK remains very low, although the risk of infection to UK residents in the affected areas is slightly higher, but is still considered to be low. There does remain a risk of imported cases from affected countries; however, this risk remains low\textsuperscript{27}. For further PHE information on management and guidance of possible cases, please see information online\textsuperscript{28}.

\textsuperscript{26} http://www.emro.who.int/health-topics/mers-cov/mers-outbreaks.html
\textsuperscript{27} www.gov.uk/government/publications/mers-cov-risk-assessment
Human influenza A(H7N9) infections

Since the first 3 human infections with avian influenza A(H7N9) were reported in China through WHO in April 2013, up to 8 May 2020, 1,568 cases have been reported, including at least 615 deaths giving an overall case fatality ratio of 39.2%. No human case of influenza A(H7N9) has occurred since April 2019.

For further updates, please see the WHO website and for PHE advice on clinical management, please see information available online.

Human influenza A(H5N1) and influenza A(H5N6) infections

Since 2003, 861 cases of avian influenza A(H5N1) have been reported including 455 deaths, giving an overall case fatality rate of 52.8%. Cases have been reported from 17 countries. From 11 May 2019 to 8 May 2020, no further cases have been reported.

As of 8 May 2020, a total of 24 human influenza A(H5N6) cases have been reported since February 2014.

Most human cases of avian influenza were exposed to H5 and H7 viruses through contact with infected poultry or contaminated environments, including live poultry markets. Since the viruses continue to be detected in animals and environments, further human cases can be expected. Even though small clusters of H5N1 and H7N9 virus infections have been reported including those involving healthcare workers, current epidemiological and virological evidence suggests that these viruses have not acquired the ability to undergo sustained transmission amongst humans. It is important to ensure that imported cases of suspect avian influenza are detected promptly to ensure public health measures including infection control can be rapidly put in place to minimise any risk of onward transmission.

29 www.who.int/csr/don/2013_04_01/en/
30 www.who.int/influenza/human_animal_interface/influenza_h7n9/en/
32 www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_09_04_2019.pdf?ua=1
Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) infections (COVID-19)

A novel coronavirus emerged in Wuhan, China in December 2019. This virus was later named Severe Acute respiratory Syndrome coronavirus-2 (SARS-CoV-2) which causes the disease name referred to as Coronavirus Disease 2019 (COVID-19). Since December, the virus has spread worldwide and a pandemic was declared by the World Health Organisation (WHO) on 11 March 2020. By 11 May 2020 over 4 million cases of COVID-19 had been reported worldwide.\(^3\)

The first cases were confirmed in the UK in late January 2020. By late May 2020 more than 250,000 cases of SARS-CoV-2 infection were confirmed in the UK.\(^4\) To monitor epidemiological trends in this new and emerging virus, PHE has created and adapted existing influenza surveillance systems and began publishing weekly national COVID-19 surveillance reports from April 2020.\(^5\)

\(^3\) [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports)


Conclusions

Low levels of influenza activity were seen in the community in the UK in 2019 to 2020, with influenza A(H3N2) being the predominant virus circulating throughout the season. Excess all-cause mortality was seen early in the season, coinciding with peak influenza activity. Excess all-cause mortality was also seen towards the end of the season, at the highest levels seen in the past 5 seasons, and associated with COVID-19 activity. Influenza activity in general practice varied across the UK (low peak activity in England, and medium in Scotland, Wales and Northern Ireland). A medium impact of influenza on the health service was experienced, with the peak admissions of influenza to both hospital and ICU/HDU similar or slightly lower than those observed in the past 2 seasons.

A novel coronavirus emerged in China in December 2019. This virus was later named SARS-CoV-2 with the associated disease being named COVID-19. Surveillance of this virus in the UK began in early 2020, with the first cases being confirmed in the UK in late January 2020. Surveillance of COVID-19 in PHE continues with a weekly national COVID-19 surveillance report published every week to summarise epidemiological trends. In the latter part of the influenza season SARS-CoV-2 impacted on various influenza indicators described in this report. Some indicators such as syndromic surveillance, ARI outbreak reporting, and excess all-cause mortality increased dramatically between weeks 11/12 and 14 2020. Other indicators such as GP ILI consultation rates and GP sentinel swabbing experienced issues because of patients not attending practices during the COVID-19 pandemic.

The 2019 to 2020 season saw the roll-out of a newly licensed cell-based quadrivalent influenza vaccine (QIVc) and the newly licensed high-dose trivalent influenza vaccine (TIV-HD). Influenza vaccine uptake in 2019 to 2020 varied across the UK. In England, the uptake rates were slightly higher than the previous season in 65+ year olds and healthcare workers, but was lower than last season for those aged 6 months to under 65 years of age with 1 or more underlying clinical risk factors and pregnant women. In Scotland, the uptake in 65+ year olds and healthcare workers was higher than the previous season, with uptake in those aged 6 months to under 65 years of age with 1 or more underlying clinical risk factors remaining at similar levels and uptake in pregnant women slightly decreasing compared to the previous season. In Wales, uptake in these targeted groups were slightly higher than the previous season with the exception of those aged 6 months to under 65 years of age with 1 or more underlying clinical risk factors. In Northern Ireland, uptake was higher than the previous season in all the target groups. Provisional vaccine effectiveness for the newly licensed QIVc vaccine were encouraging in the 18 to 64 years age group.
The roll out of the childhood LAIV programme continued across the UK which was first implemented in the 2013 to 2014 season and, is now in its seventh season with all primary school aged children now being offered the vaccine. The programme targeted 2 to 3 year olds in England and Wales and 2 to <5 year olds (not yet in school) in primary care and all children of school year reception, 1, 2, 3, 4, 5 and 6 across the UK. Uptake levels varied by country. A slight decrease in uptake was seen in primary care delivery in England and Scotland and increases in uptake was seen in primary care delivery in Wales and Northern Ireland. Slight decreases in uptake among primary school aged children was seen in England, Scotland and Northern Ireland with uptake in Wales remaining the same as the previous season. Further work and observations from this and future seasons will be critical to evaluate this programme and to inform its optimal rollout to other school years.

Activity from other typical circulating respiratory viruses, including rhinovirus, adenovirus, parainfluenza and hMPV, was overall similar to that seen in the previous few seasons. RSV levels were lower than that observed in previous seasons.

Surveillance continues within the UK for novel respiratory viruses, including SARS-CoV-2 and the 2 which were first identified in 2012 to 2013: MERS-CoV and influenza A(H7N9), both of which have high reported case fatality ratios, and where there is risk of importation to the UK.
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