

Surveillance of influenza and other respiratory viruses in the United Kingdom: October 2004 to May 2005

H Zhao, MK Cooke, CA Joseph, J Ellis, M Zambon, DM Fleming, JS Nguyen-Van-Tam, JM Watson

Summary

Influenza activity remained low in the United Kingdom (UK) throughout the 2004/05 season. Clinical activity increased slowly and peaked late in the season (January to March) in comparison with the early peak in clinical activity observed in 2003/04. In England, Scotland, and Wales rates for influenza and influenza-like illness remained close to or below baseline levels and Northern Ireland, where thresholds are not used, recorded a peak in clinical activity below that of last season. Virological activity remained at low levels in England and Wales, with influenza A/Wellington/01/2004 (H3N2)-like viruses identified as the dominant circulating strain. Detections of influenza B occurred late in the season representing 15% of detections characterised by the Health Protection Agency Virus Reference Department this season and detections of respiratory syncytial virus (RSV) were at similar levels to 2003/04.

Internationally the most significant events in the season were the continuing spread of poultry outbreaks of avian influenza A (H5N1) in Asian countries, associated with sporadic cases/small clusters of human infections.

Keywords: *influenza, epidemiology, outbreak, surveillance*

Introduction

The Health Protection Agency (HPA) monitors the activities of influenza and other respiratory viruses in the United Kingdom (UK) throughout the year. A particular focus is placed over the winter period between October and May during which time the activities of influenza and other respiratory viruses normally reach their highest levels in the UK. The aims of the surveillance are to provide timely and up-to-date information on activities of influenza and other respiratory viruses for

healthcare professionals, the media and the public, and to assess the health impact (morbidity and mortality) of influenza and other respiratory diseases; to monitor circulating strains of influenza virus; to detect new subtypes and strains of epidemic potential; and to use the information acquired during monitoring to contribute to the decision on the vaccine compositions for the following season.

H Zhao, MK Cooke, CA Joseph, JS Nguyen-Van-Tam, JM Watson

Respiratory Diseases Department
Health Protection Agency (HPA)
Centre for Infections (CFI)

J Ellis, M Zambon
Virus Reference Department (VRD)
Health Protection Agency
Centre for Infections

DM Fleming
Royal College of General Practitioners (RCGP)
Birmingham Research Unit

Address for correspondence:

Dr Hongxin Zhao
Respiratory Diseases Department
Health Protection Agency
Centre for Infections
61 Colindale Avenue
London NW9 5EQ
tel: 020 8327 7561
fax: 020 8200 7868

Methods

HPA influenza surveillance relies on the timely collection of clinical and virological data across the UK. Information sources have been described previously [1]. A brief summary is provided in table 1.

Results

Clinical

England and Wales – Royal College of General Practitioners (RCGP)

Clinical rates for influenza-like illness peaked in the first weeks of 2005, later in the season and at lower levels than that observed during the 2003/04 season. General practitioner (GP) consultations for influenza-like illness peaked at 39 per 100,000 in week 01/05, only slightly above the baseline threshold (30 consultations per 100,000) (figure 1).

Regionally, consultation rates reached the earliest, and highest peak in northern England at 62 consultations/100,000 in week 01/05. Consultation rates in central and southern regions peaked in weeks 03/05 (43/100,000) and 05/05 (35/100,000), respectively.

The highest consultation rates were reported for those aged 4 years and under at 62 per 100,000 in week 52/04, less than half that of the 2003/04 peak rate in the same age group. Other age groups peaked between weeks 01/05 and 03/05 (figure 2).

Consultation rates for acute bronchitis (AB) peaked at

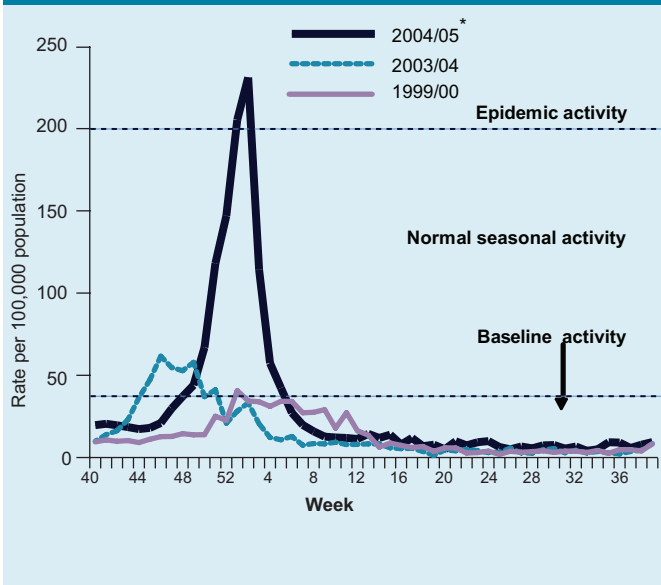
Table 1 Data sources for influenza surveillance in the UK

Data type	Organisation	Description
Clinical	Royal College of General Practitioners (RCGP) Weekly Returns Service. (England)	Weekly morbidity data derived from 73 sentinel GP practices. Each new consultation is recorded and defined by using diagnostic guidelines. (Rates per 100,000 population for influenza and flu-like illness)
	HPA Communicable Disease Surveillance Centre (CDSC) Northern Ireland. (Northern Ireland)	Weekly morbidity data derived from sentinel GP practices for influenza and flu-like illness, and call rates for all causes to out-of-hours GP Co-operatives.
	National Public Health Service for Wales (NPHS) (Wales)	Weekly morbidity data derived from sentinel GP practices for influenza (Rates per 100,000 population for influenza)
	Health Protection Scotland (HPS) (Scotland)	Weekly morbidity data derived from sentinel GP practices for each consultation for influenza-like illness. (Rates per 100,000 population for influenza)
	NHS Direct (England and Wales)	Weekly total call, cold/flu and fever call rate derived from a 24-hour nurse advice and health information service.
	Medical Officers of Schools Association (MOSA) (England and Wales)	Weekly rates per 1000 boarding school children for influenza and flu-like illness.
	Influenza Vaccine uptake monitoring. Influenza/Respiratory virus section, HPA Centre for Infections (CFI), Colindale (England)	Monthly data collected from October to December derived from general practices through flu immunisation coordinators in primary care trusts (PCTs) before forwarding to CFI for data at the regional and national level.
Virological	Virus Reference Department (VRD), HPA Centre for Infections (CFI), Colindale (UK)	Analysis of influenza strains: subtyping, antigenic and genetic characterisation of viruses referred from UK laboratories (HPA and NHS)
	RCGP/CFI Virological surveillance Scheme (England)	Community-based sampling by GPs participating in the RCGP spotter practice scheme.
	CFI Virological Surveillance of Influenza Scheme (England)	Community-based sampling by 45 sentinel GPs.
	HPA/NHS laboratory reports. (England and Wales)	Positive respiratory virus specimens routinely reported to CFI from NHS and HPA laboratories
Mortality	Office for National Statistics (ONS) (England and Wales)	Weekly registration of deaths by age and cause
Outbreaks	HPA Centre for Infections	Information on outbreaks of influenza and other respiratory illness reported to the HPA Influenza/Respiratory Virus Team, Centre for Infections, Colindale.

213/100,000 in week 01/05, at a similar rate and time period as last season (227/100,000 in week 02/04). Consultation rates for total respiratory diseases (TRD) peaked at 651/100,000 in week 52/04, also at a similar rate and time period as last season (683/100,000 in week 51/03) (figure 3). The highest consultation rates were found among those in the 4 years and under age group at 614 consultations/100,000 in week 49/04, earlier and lower than the peak rate recorded in this age group last season (682/100,000 in week 51/03).

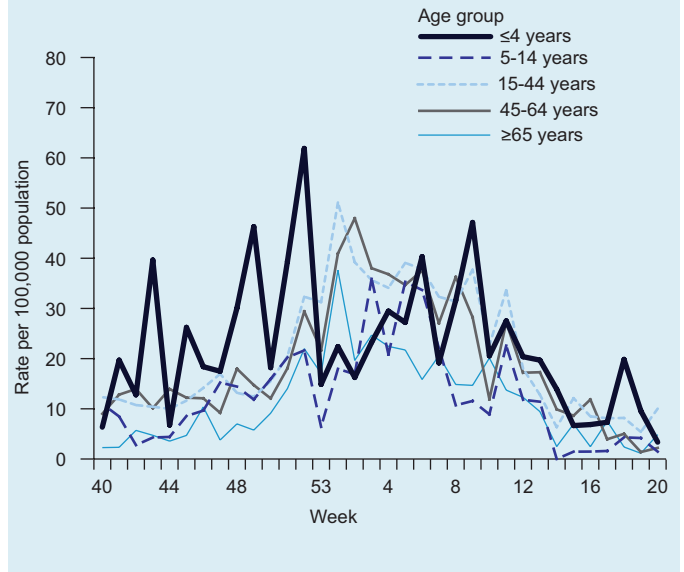
Wales – National Public Health Service for Wales (NPHS)
Consultation rates in the sentinel GP scheme co-ordinated by the National Public Health Service for Wales (NPHS) remained within the range of baseline activity (less than 25/100,000) for the duration of the 2004/05 season (figure 4). The peak rate occurred in week 07/05 (week ending 20/02/05) at 10 consultations/100,000 and the highest rates recorded were in the 65 years and over age group (17/100,000 in week 01/05).

Figure 1 RCGP consultation rates for Influenza-Like Illness, 2004/05 and Recent Years



* Please note that for comparison with previous years, data for week 51 on this graph represents the average of weeks 51/04 and 52/04 and data for week 52 on this graph represents week 53/04.

Figure 2 RCGP consultation rates for Influenza-Like Illness by age group, 2004/05.



Scotland – Health Protection Scotland (HPS)

Consultation rates in the sentinel flu spotter GP scheme coordinated by Health Protection Scotland (HPS) remained within the range of baseline activity (less than 50/100,000) for the duration of the influenza season (figure 4). The peak rate occurred in week 11/05 (week ending 20/03/05) at 43 consultations per 100,000. Age specific data recorded by Scottish Enhanced Respiratory Virus Infection Surveillance (SERVIS) showed the highest rates in those aged between 20 and 49 years during the 2004/05 season.

Northern Ireland – The Communicable Disease Surveillance Centre (CDSC Northern Ireland).

This was the fifth year of the enhanced surveillance scheme in Northern Ireland and baseline thresholds have not yet been formally established for this scheme. The combined rate for influenza and influenza-like illness remained low during the 2004/05 season, and below levels recorded in 2003/04. The peak rate occurred in week 50/04 (week ending 12/12/05) at 99 consultations per 100,000, with the highest rates recorded in those aged 4 years and under (figure 4).

Figure 3 RCGP consultation rates for total respiratory disease (TRD), influenza-like illness (ILI) and acute bronchitis (AB): 1998 to 2005

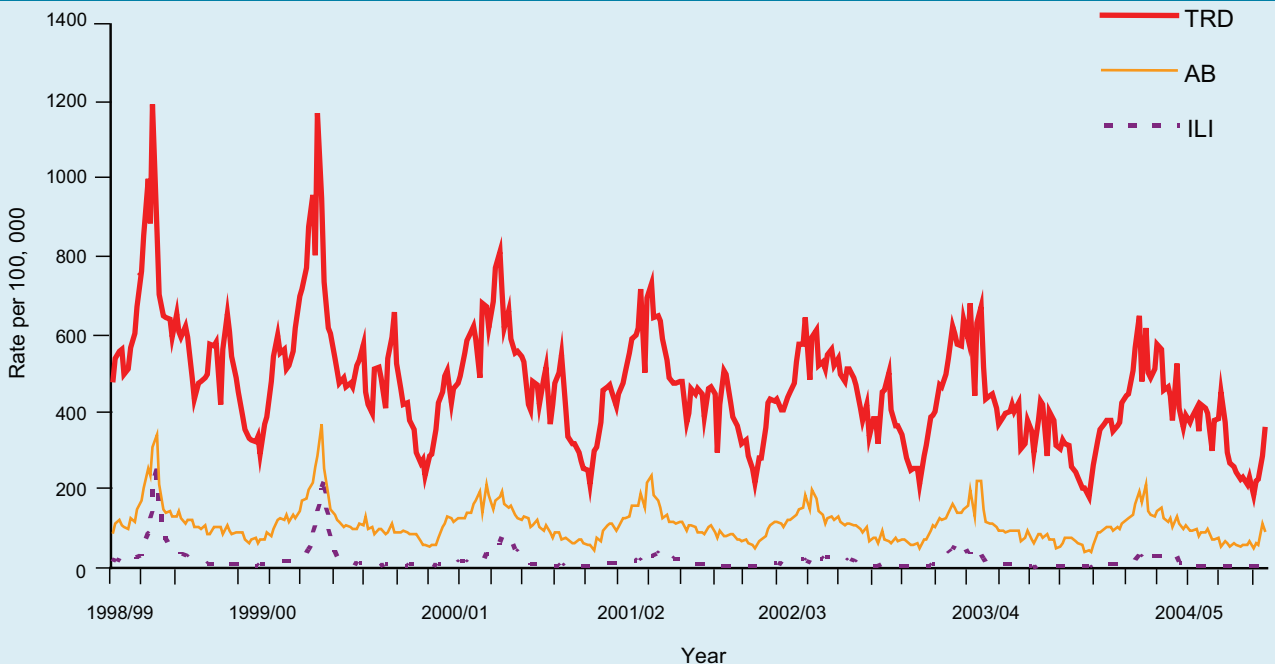
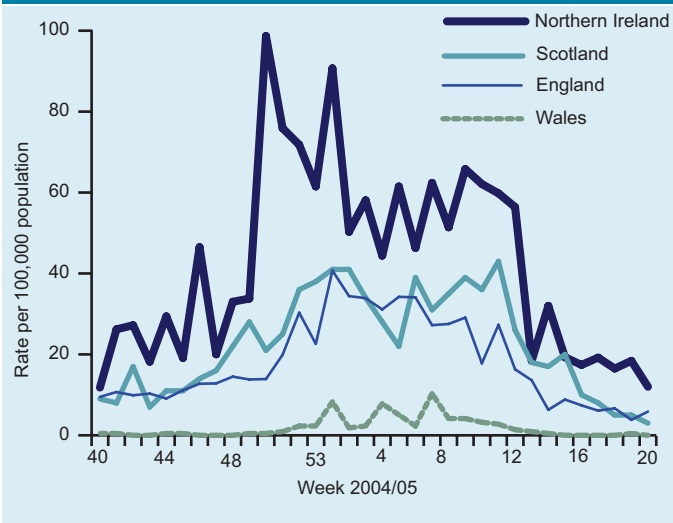


Figure 4 GP consultation rates for influenza and influenza-like illness in the UK, 2004/05



NHS Direct

The peak in NHS direct total call activity occurred in week 53/04 (week ending 2 January 2005) at 350 calls/100,000 population with the proportion of cold/flu calls to NHS Direct peaking in weeks 53/04 and 01/05 (2.1%). This was seven weeks later than the previous season 2004/05; and the proportion of fever calls to NHS Direct peaked in week 05/05 (4.6%), much lower and later (11 weeks later) than the previous season 2003/04 (peaking at 7.8% in week 46/03) (figure 5). Within the different age groups, the highest proportion of cold/flu calls were recorded for those aged between 45 and 64 years (2.9% in weeks 53/04 and 01/05); and the highest proportion of fever calls were recorded for those aged 4 years and under (13.5% between weeks 02/05 and 05/05) (figure 5).

Influenza Outbreaks

The HPA Centre for Infections (CfI) received twenty-two outbreak reports for laboratory confirmed influenza during the 2004/05 season. Of these, one outbreak took place in a care home, four in residential homes for the elderly, nine in hospital wards, and eight in schools. The majority of outbreaks occurred in the period between January and March 2005.

Attack rates varied considerably, ranging from 2% to 76%, the latter associated with an outbreak in a nursing home. Influenza A (H3) was identified as the causative agent in seven outbreaks, influenza B in one outbreak and influenza A untyped in 14 outbreaks.

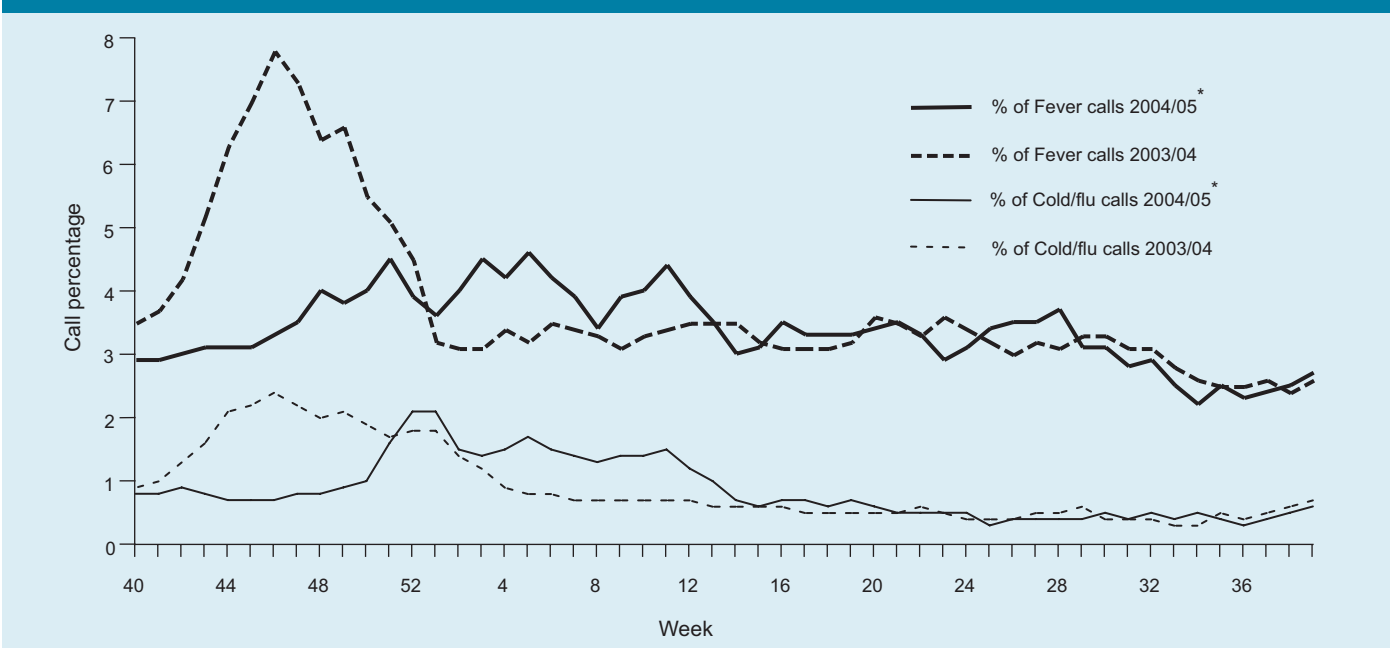
Mortality

The number of weekly deaths due to all causes for England and Wales, by date of registration, peaked during week 02/05 (week ending 13/01/05) at 12,733, lower than the peak observed in 2003/04 (16,282 deaths in week 02/04). The cumulative total of deaths registered during the season (354,148 between week 40/04 and 20/05) did not differ greatly from the 2002/03 figure for the same period (348,811 deaths).

The combined number of deaths attributed to acute bronchitis, pneumonia, and influenza between weeks 40/04 and 20/05 (24,464) was also similar to the 2003/04 figure of 24,650. Influenza was recorded as the primary cause of death in 50 cases during the 2004/05 season. This is similar to last season when 65 deaths were registered, but still substantially lower than the 540 influenza deaths registered in the last influenza epidemic of 1999/2000.

The annual estimate of excess mortality due to influenza (using death by registration data from ONS) was calculated using a time series model [2]. The total estimated number of excess deaths attributable to influenza between week 40/04 and week 20/05 was 1268 compared to 4179 for the previous season (table 2).

Figure 5 NHS Direct calls for cold/flu and fever: 2004/05



* Please note that for comparison with previous years, data for week 51 on this graph represents the average of weeks 51/04 and 52/04 and data for week 52 on this graph represents week 53/04.

Table 2 Estimated excess mortality due to influenza in England and Wales*

Influenza Season	Number of excess deaths
88/89	713
89/90	27,202
90/91	8226
91/92	6020
92/93	1689
93/94	14,436
94/95	2299
95/96	15,812
96/97	21,413
97/98	–
98/99	17,433
99/00	21,390
00/01	741
01/02	6705
02/03	6137
03/04	4179
04/05	1268

* Every year the model is revised to incorporate the current season's data. The fitted model then not only creates a figure for the most recent season, but also readjusts the previous years' figures.

Virological

Respiratory Virus Unit (RVU), Virus Reference Department (VRD) HPA Centre for Infections (CfI)

Between weeks 40/04 (week ending 03/10/2004) and 20/05 (week ending 22/05/05), 672 influenza positive specimens were detected from hospitals, and the majority (66.5%, N= 447) were typed as influenza A (H3). In addition, 311 samples from all community sources tested positive for influenza. The majority of these (79.7%, N=248) were identified as influenza A (H3) viruses (table 3). Community derived detections were predominantly from those aged between 15 and 44 years, while the hospital detections were mainly from children aged 4 years and under.

Of the 455 virus isolates further characterised between week 40/04 and 20/05, 86 were antigenically similar to the vaccine strain influenza A/New Caledonia/20/99 (H1N1), 266 were antigenically similar to influenza A/Wellington/01/04 (H3N2)-like, and 13 were similar to the influenza A/California/07/04 (H3N2)-like strain. Of those influenza B isolates characterised, the majority (N=74) were antigenically similar to the influenza B/Shanghai/361/2002-like vaccine strain and 16 were antigenically similar to the influenza B/HongKong/330/2001-like strain (figure 6).

Laboratory reports from HPA/NHS laboratories in England and Wales

Detections of influenza from samples sent for routine testing to HPA and NHS laboratories, between 40/04 and week 20/05 yielded:

- 1190 confirmed influenza A infections (peak of 56 detections in week 05/05); of these 819 were detected by serological methods and 371 by direct immunofluorescence (DIF) and PCR. Isolates were referred to VRD/CfI for further characterisation.
- 246 confirmed influenza B infections (peak of 26 detections in week 10/05); of these 185 were detected by serological test methods and 61 by DIF and PCR.
- 5113 confirmed respiratory syncytial virus (RSV) infections

Table 3 Virological typing of positive specimens received by VRD/RVU* during the 2004/05 influenza season (week 40/04 – week 20/05), PCR or virus isolation

Source	Influenza type/subtype								RSV*
	A/H1	A/H1N1	A/H1N2	A/H3	A/H3N2	(A) total	B	Total Influenza	
Hospital	113	7	–	434	13	567	105	672	4
Community	5	17	–	181	67	270	41	311	25
Total	118	24	–	615	80	837	146	983	29

*VRD = HPA's Centre for Infections (CfI) Virus Reference Department.
RVU = The CfI Influenza/Respiratory Virus Unit.

(peak of 613 detections in week 51/05); of these 523 were detected by serological test methods and 4590 by DIF and PCR.

- Parainfluenza activity followed a similar pattern to that of previous years, with sporadic detections of parainfluenza serotype 2 and parainfluenza serotype 1 peaking in the winter months (week 45/04 and reports of serotype 3 peaking in week 13/05).

Community Surveillance schemes (RCGP/CfI virological surveillance scheme)

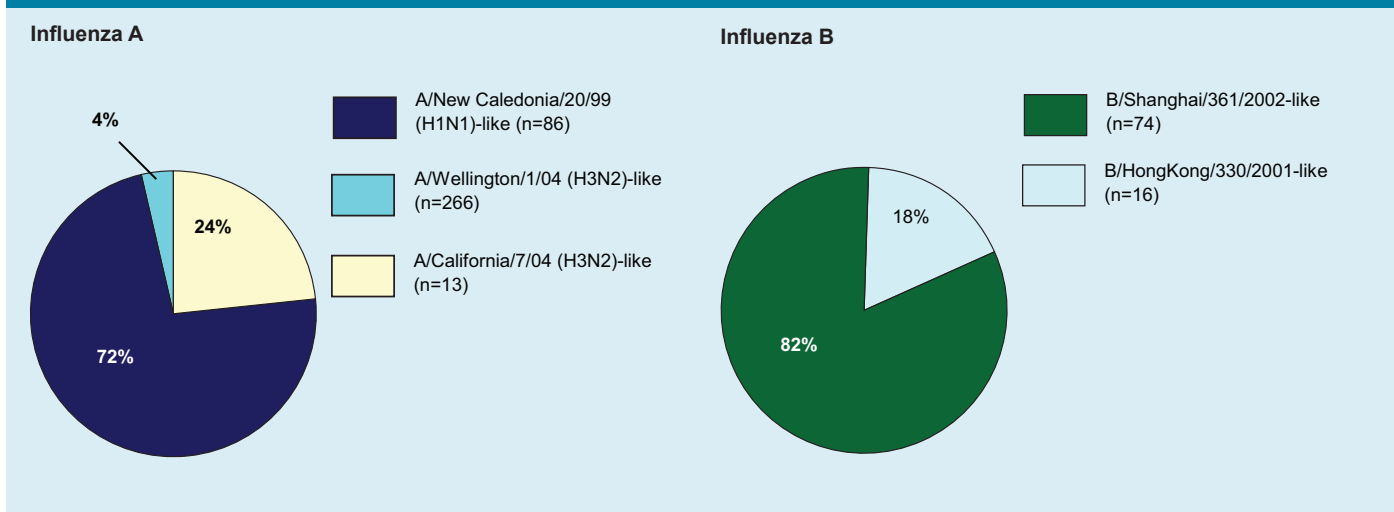
Between weeks 40/04 and 20/05, 473 samples from the RCGP community-based surveillance scheme were tested for influenza. Of these, 157 (33%) were positive for influenza and 17 (4%) positive for RSV. Of those specimens positive for influenza, 80 (51%) were influenza A (H3), 35 (22%) were A (H3N2), 4 (3%) were Influenza A (H1), and 16 (10%) influenza A (H1N1). Influenza B detections remained low at 22 detections (14%) of all influenza detected during the 2004/05 season.

CfI/CDSC virological surveillance scheme

Sixteen laboratories participated in the scheme during 2004/05, and 42 GP's submitted 396 specimens. Influenza A was detected in 67 (17%) of these specimens, and influenza B in 29 (7%). RSV and other respiratory viruses were detected in 8 (2%) samples. The age group with the highest positivity rate for influenza was those aged 4 years and under at 42%.

Vaccine uptake monitoring on behalf of the Department of Health

The uptake target set by the Department of Health for all patients aged 65 years and over was 70% for the 2004/05 season. Of the 303 Primary Care Trusts (PCTs) in England, 303 (100%) took part and 258 (85%) achieved uptake rates of 70% or more, a greater coverage than the 79% achieved for the 2003/04 season. Of the 7,870,212 people aged 65 years and

Figure 6 Influenza strains detected by VRD/RVU from community and hospital sources during 2004/05

over who were registered with a GP in England, 5,621,381 (71.4%) received the influenza vaccine during the 2004/05 season [3].

Vaccine match

In the UK, the circulating strains isolated in 2004/05 showed a relatively good match with the corresponding influenza vaccine component. The influenza A/Wellington/01/04 (H3N2)-like subtype that predominated (59%) in the UK during this season was not included in the vaccine for the 2004/05 season, but a degree of cross protection was offered by the influenza A (H3N2) strain that was included (A/Fujian/411/02-like). Twenty per cent (n=110) of the influenza A isolates were antigenically similar to the vaccine strain influenza A/New Caledonia/20/99 (H1N1), and the majority (84%) of the influenza B isolates characterised for this season were antigenically similar to the influenza B/Shanghai/361/2002-like vaccine strain. The vaccine, is likely to have conferred a good protection which, along with the good vaccine coverage, may have contributed to the low activity seen during this season.

Vaccine recommendations

The World Health Organization (WHO) announced the vaccine composition for the 2005/06 (northern hemisphere winter) on 10 February 2005 [4]. It was recommended that the vaccine contain the following:

- an A/New Caledonia/20/99(H1N1)-like virus
- an A/California/7/2004-(H3N2)-like virus*
- a B/Shanghai/361/2002-like virus†

Influenza activity elsewhere

Influenza activity across Europe was variable during the 2004/05 season, and influenza activity started later than 2003/04, in late December 2004. When influenza activity started spreading, it moved west to east, but changed to a

south to north spread later in the season. Clinical influenza activity remained low in Italy, the Netherlands, Slovenia, Spain, and Switzerland, but was reported at its highest level for eight seasons in Spain. The highest incidences of influenza-like illness were recorded among children aged under 14 years and the season was dominated by two A (H3N2) variants of the influenza A/Wyoming/3/2003 strain (influenza A/Wellington/1/2004 (H3N2) and influenza A/California/07/2004 (H3N2)).

Discussion

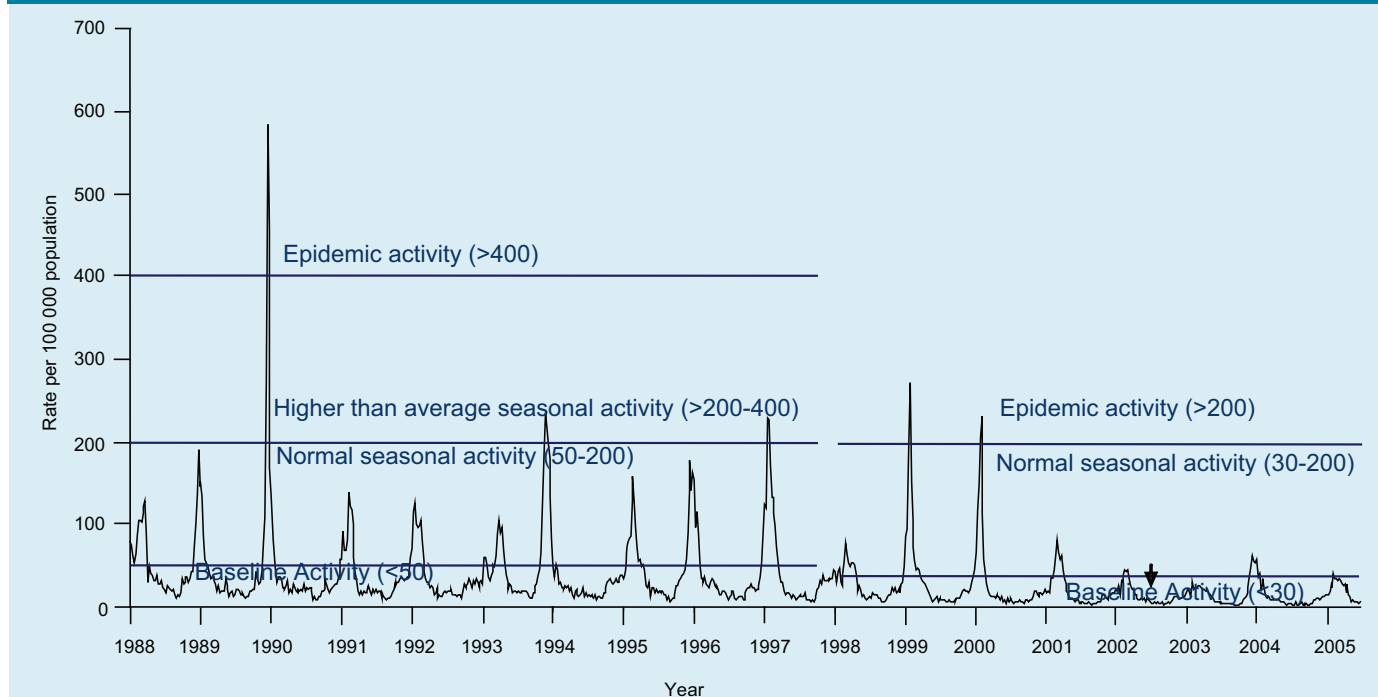
Influenza activity during the 2004/05 season remained low in England and other parts of the UK with levels barely passing the baseline threshold. This is the fifth consecutive influenza season of low activity after the last influenza epidemic observed during the 1999/2000 winter season (figure 7). Influenza activity for this season started later than the previous season, with rates rising in the early weeks of 2005. The RCGP consultation rates for all ages for this season peaked at 39/100,000 in week 01/05 and stayed just above the baseline level of 30 per 100,000 for six weeks. The rates for children aged 4 years and under, however, peaked earlier in week 52/04 and reached higher levels than in any other age groups at 62/100,000. In comparison with the previous season during which the under 4 years age group also recorded the highest rates (157/100,000) among all age groups, the rates for this age group in this season were significantly lower and also peaked three weeks later than that of last season [5].

There is no clear and widely accepted explanation for the exceptionally low level of influenza activity in the UK in the 2004/05 season, and generally low levels in the previous four winters. Both subtypes of influenza A (H3N2 and H1N1) have been in circulation for many years (over 30 years for H3N2 and over 20 years for H1N1). Their capacity to cause substantial winter epidemics may be declining as fewer antigenic strain variants emerge from year-to-year. If influenza immunisation has played any part in the reduction in influenza virus activity, its role is likely to be limited. Uptake is concentrated in the 65 years and over age group and is unlikely to impact on transmission of infection to the rest of the population.

Virological activity remained at low levels in England and

* A/New York/55/2004 is available as a vaccine virus.

† The currently used vaccine viruses are B/Shanghai/361/2002, B/Jiangsu/10/2003 and B/Jilin/20/2003.

Figure 7 Weekly consultation rates for influenza-like illness RCGP weekly returns service: 1988 to 2005 including the old and new thresholds

Wales during this season, with influenza A/Wellington/01/2004 (H3N2)-like viruses identified as the most commonly characterised circulating strain. Detections of influenza B occurred late in the season representing 15% of detections characterised by VRD this season. Detection of RSV was at similar levels to 2003/04.

Similar numbers of outbreaks were reported in this season compared to the last season [5] but these outbreaks occurred later this season (January to March 2005) compared to the previous season (mainly between October and December 2003 with two school outbreaks in May and June 2004). Nine out of the 22 outbreaks occurred in hospital wards which was not seen in the previous season. Reporting bias, however, needs to be taken into consideration when interpreting these outbreak reports. Like the previous season, the majority of causative agents for these outbreaks were influenza A (H3) and influenza A untyped.

Thresholds

The new thresholds [5], approved by the Chief Medical Officer for England, have been used to describe levels of influenza activity for the 2004/05 season in England and Wales (RCGP scheme). Thresholds, and a standard set of definitions, are used to provide a clear and consistent message to the general public and media about the level of influenza virus circulation, and provide an indication to GPs when sufficient virus is circulating in the community to warrant the use of antiviral drugs. In light of data analysis undertaken by the HPA, the previous thresholds were considered to be no longer appropriate [6]. Using the new criteria, levels of influenza activity from 1988 to 2005 are shown in Figure 7. From this figure combining the old and new thresholds, it can be seen that the 2004/05 season was the fifth consecutive low season of influenza activity since 2001.

Outbreaks of avian influenza A (H5N1)

Internationally the most significant events this season have been the continuing spread of outbreaks of avian influenza A (H5N1) in poultry in Asian countries. The outbreaks reached Europe (Romania and Turkey) by 13 October 2005 [7]. The World Health Organization (WHO) level of pandemic alert remained at phase 3: a virus new to humans is causing infections, but spread from one person to another is rare and not sustained (7). Human infections with avian influenza A (H5N1) viruses continue to be identified. The majority of cases have been associated with direct exposure to A (H5N1)-infected poultry. Probable and limited person-to-person transmission of A (H5N1) viruses during 2004 occurred in Thailand [8] and is one of several possible explanations for the observed increase in clusters of A (H5N1) cases in northern Vietnam during 2005 [9]. Limited person-to-person transmission of A (H5N1) was also identified during the 1997 outbreak in Hong Kong [10]. Efficient person-to-person transmission of influenza A (H5N1) viruses has not been reported. Genetic analysis of influenza A (H5N1) viruses isolated from humans in 2004 and 2005 revealed that all genes were of avian origin [11].

The HPA continues to recommend enhanced surveillance for influenza A (H5N1) infection among travellers with severe unexplained respiratory illness returning from A (H5N1)-affected countries. Additional information is available at http://www.hpa.org.uk/infections/topics_az/influenza/avian/guidelines.htm.

Additional information on influenza in the UK, including avian influenza, is available at http://www.hpa.org.uk/infections/topics_az/influenza/default.htm. Updates on human infections with avian influenza are available from the World Health Organization at http://www.who.int/csr/disease/avian_influenza/en/.

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