

CDR Supplement

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Influenza surveillance in the United Kingdom: October 2000 to May 2001

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Summary

The 2000/01 influenza season was characterised by low levels of activity associated with influenza A (H1N1) and influenza B throughout the United Kingdom. Respiratory syncytial virus and acute bronchitis also remained at low levels. Consultation rates with general practitioners for influenza-like illness remained within the range of 'normal seasonal activity', with older children and young adults predominantly affected. A large number of outbreaks were reported. Over the New Year period there were low attack rates for respiratory infections, especially in the elderly, and only limited disruption to health services.

Keywords: *influenza, epidemiology, outbreak*

Introduction

Surveillance of influenza and other acute respiratory virus activity provides a timely assessment of the nature and extent of circulating viruses. Data are communicated to health professionals to inform decisions when there are high levels of virus in circulation. Circulating strains of influenza are monitored and compared with previous strains and the current vaccine. These observations are used to contribute to the decision about the vaccine composition for the following year. At the end of the season, the impact of influenza on morbidity and mortality is assessed and compared with previous years.

Methods

Details of data used in influenza surveillance in England and Wales have been described in detail previously^{1, 2, 3} and are summarised in table 1. Thresholds – used to describe different levels of influenza activity based on consultation rates with general practitioners in different sentinel schemes in England, Wales, and Scotland – have also been previously described⁴.

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Results

Clinical

Royal College of General Practitioners (RCGP) Weekly Returns Service

In the Royal College of General Practitioners (RCGP) sentinel surveillance scheme, weekly general practitioner (GP) consultations for influenza and 'influenza-like illness' (ILI) remained below baseline (less than 50 new episodes per 100 000 population) until week 5/01 and peaked at 81/100 000 in week 6/01. This rate remained at the lower end of the range for 'normal seasonal activity' of 50-200/100 000 population. Rates declined rapidly and returned to baseline levels in week 10/01 (figure 1)

Consultation rates were highest in the RCGP central region (100/100 000) while the lowest peak was in the RCGP northern region (63/100 000). The highest consultation rates were in children aged 5 to 14 years (112 /100 000 in week 6) followed by people aged 15 to 44 years (91/100 000 in week 5) (figure 2).

GP consultation rates for acute bronchitis peaked in 01/01 with a rate of 213/100 000 population. This rate was substantially lower than the peak seen during the 1999/00 season (380/100 000). Consultation rates were highest among children aged 0 to 4 years (773/100 000 in week 50), followed by people aged 65 years or over (430/100 000 in 01/01). Again, these rates were well below the peak rate seen in 1999/00 (1061/100 000 in people aged 65 years or over). GP consultation rates for 'total respiratory disease' also remained lower than seen during the 1999/2000 season with a peak rate of 939/100 000, compared with 1118/100 000 in 99/00.

PHLS Communicable Disease Surveillance Centre (CDSC) Wales

Consultation rates in the sentinel GP scheme co-ordinated by CDSC Wales remained within the range for 'baseline activity' of less than 25/100 000 population for the entire 2000/01 season. Rates peaked at 18/ 100 000 in week 10/01 (figure 3).

Scotland

In the sentinel GP scheme co-ordinated by the Scottish Centre for Infection and Environmental Health (SCIEH),

Table 1 Data sources for influenza surveillance in Britain			
Clinical	Virological	Deaths	Other
Royal College of General Practitioners (RCGP) Weekly Returns Service ² <i>Weekly rates per 100 000 population for influenza and flu-like illness</i>	Enteric, Respiratory and Neurological Laboratory (ERNVL) Influenza Section (UK WHO National Centre) ⁴ <i>Analysis of influenza strains: subtyping, antigenic and genetic characterisation of virus</i>	Office for National Statistics <i>Weekly deaths by age and cause</i>	Reports of outbreaks of influenza <i>Follow up of outbreaks in nursing homes, schools etc</i>
PHLS Communicable Disease Surveillance Centre (CDSC) Wales ³ <i>Weekly rates per 100 000 population for influenza</i>	RCGP/ERNVL Virological Surveillance Scheme ^{5,6} <i>Community based sampling for influenza</i>		Reports from other European countries, US, WHO, etc
Scottish Centre for Infection and Environmental Health (SCIEH) <i>Weekly rates per 100 000 population for influenza-like illness</i>	PHLS Virological Surveillance of Influenza Scheme <i>Community based sampling for influenza</i>		
Medical Officers of Schools Association (MOSA) <i>Weekly rates per 1000 boarding school children for influenza and flu-like illness</i>	PHLS/NHS laboratory reports <i>Laboratory reports of influenza A or B</i>		

GP consultation rates for influenza and ILI remained below the threshold for baseline activity (less than 50 episodes / 100 000 population) until week 52/00, and peaked at 62 /100 000 in 02/01. This rate remained at the lower end of the range for 'normal seasonal activity' of 50-600 /100 000 population. Rates fluctuated before returning to baseline levels in week 08/01.

Outbreaks

During the 2000/01 influenza season 30 outbreaks of ILI were reported to CDSC. Twenty of the outbreaks occurred in schools that participate in the Medical Officers of Schools Association (MOSA) reporting scheme, six occurred in non-MOSA schools, two in nursing homes, and one each in a hospital and a naval training base. The duration of the

outbreaks ranged from one to six weeks, with the number of individuals affected in each outbreak ranging from less than ten to approximately 300. Specimens were taken from individuals in ten of the outbreaks, and influenza virus was isolated from all but two of the outbreaks. Two outbreaks (one in November and one in December 2000) were associated with influenza A, and five outbreaks (three in January and two in February 2001) were associated with influenza B.

Mortality

The weekly total number of deaths due to all causes remained low throughout the 2000/01 influenza season, peaking at 12 345 in week 01/01. This figure is substantially lower than the peak of 20 772 seen during the 1999/00 influenza season (figure 4). Thirty-six deaths were directly attributed to

Figure 1 Weekly consultation rates for influenza and influenza like illness: RCGP Weekly Returns Service, 1988-2001

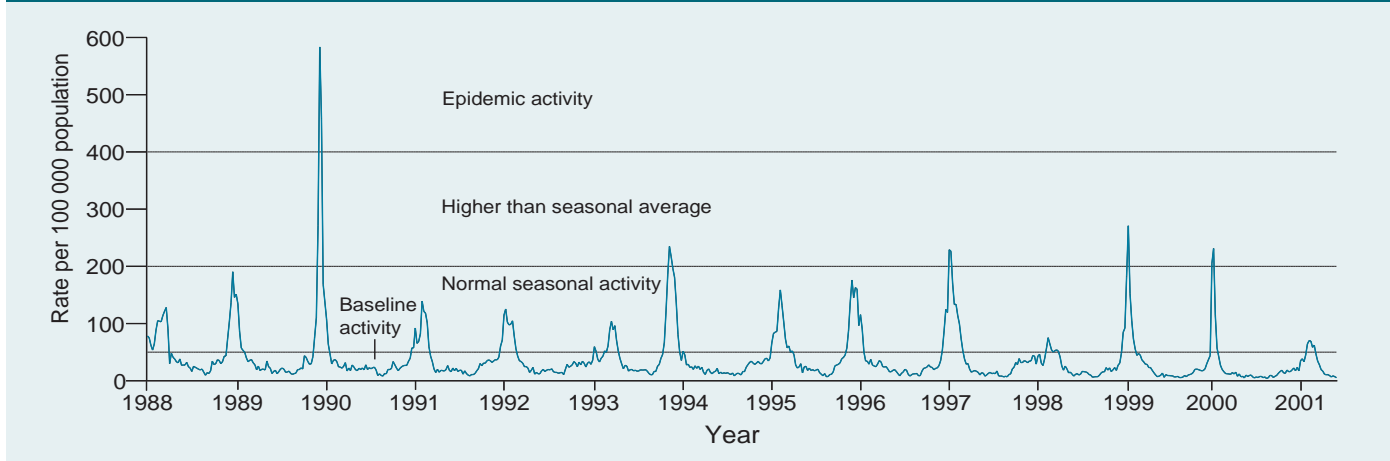


Figure 2 RCGP consultation rate for influenza and influenza-like illness by age, 2000-01

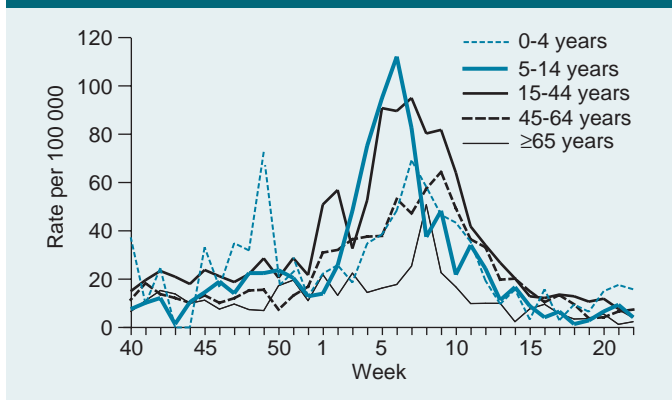


Figure 3 GP Consultation rates for influenza and influenza-like illness for England, Wales, and Scotland, 2000-01



influenza between week 40/00 and week 16/01. This figure is provisional and may be revised later, although it remains considerably lower than the 503 deaths attributed to influenza during 1999/00. The total estimated number of excess deaths attributed to influenza between weeks 40/00 and 33/01, using a time series method based on the method of Serfling⁵, was 0 (unpublished PHLS data) (table 2).

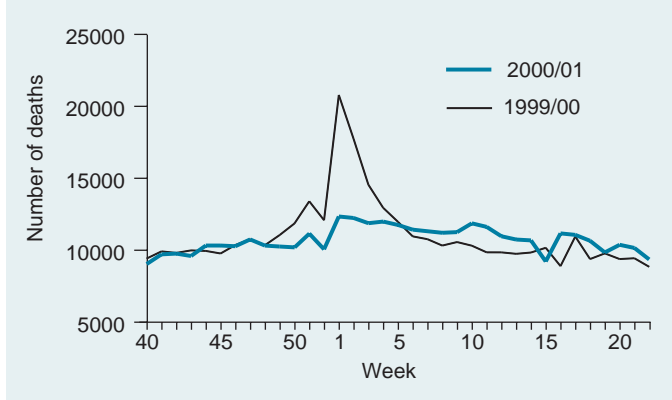
At the beginning of 2001 the Office for National Statistics (ONS) implemented the ICD-10 coding system for cause of death. An exercise is being undertaken by ONS to assess the impact of the new classification, especially in relation to trends in mortality by disease.

NHS Direct total call rate activity

During the winter of 2000/01, there were two distinct peaks in the NHS Direct total call rate for England and Wales. The first peak occurred over Christmas (week 52/00) when the total call rate was 205/100 000 population. A second peak in the total call rate (weeks 05/01 and 06/01: 192/100 000) coincided with the peak in influenza activity indices from other sources (RCGP and PHLS).

As well as total call data, counts of callers with 'colds/flu' (use of 'colds/flu' algorithm by NHS Direct nurse) were collected from six NHS Direct sites (population coverage=16 million). These preliminary data show a similar pattern to total calls.

Figure 4 Deaths due to all causes notified to ONS by week of notification



Virological

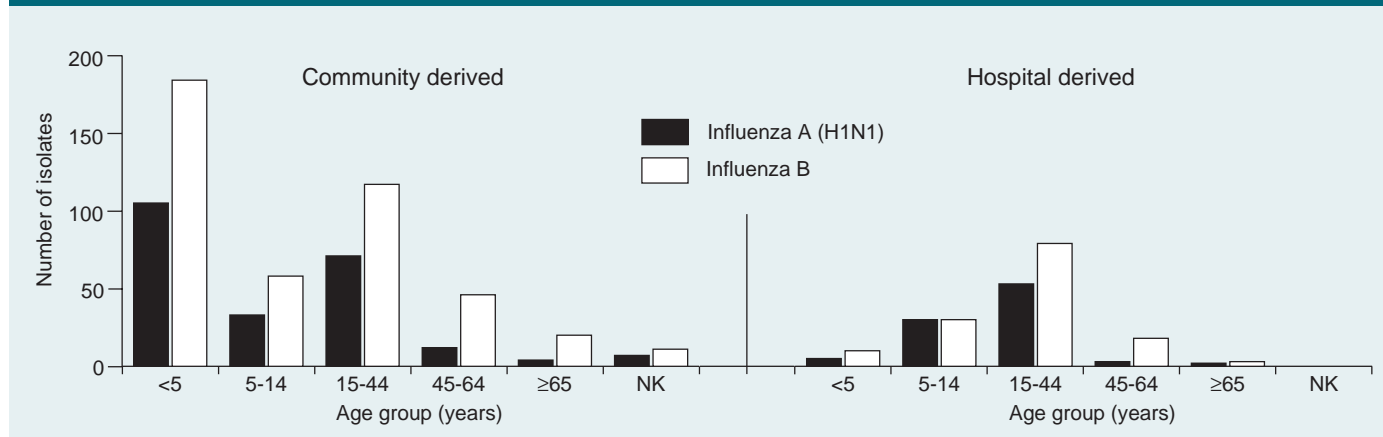
PHLS Enteric, Respiratory, and Neurological Virus Laboratory (ERNVL) Influenza Section

Between 2 October 2000 and 29 April 2001 the PHLS Enteric, Respiratory, and Neurological Virus Laboratory (ERNVL) confirmed 883 influenza isolates from samples from both community and hospital sources. Three hundred and twenty-three (37%) were influenza A (H1N1) and 560 (63%) were influenza B. The majority of influenza A (H1N1) isolates were antigenically similar to the current vaccine strain, A/New Caledonia/20/99, although three isolates were more closely related to an older H1N1 strain, A/Bayern/7/95. The influenza B isolates were closely related to B/Yamanashi/166/98, the current influenza B vaccine strain. Community-derived isolates were predominantly from patients from the 5 to 14 year and 15 to 44 year age groups. Hospital derived isolates, however, were mainly from children less than 5 years and patients aged from 15 to 44 years (figure 5). No influenza A (H3N2) viruses were isolated during the 2000/01 season.

Table 2 Excess mortality due to influenza in England and Wales

Year	Number of excess deaths
1988/89	150
1989/90	25786
1990/91	6552
1991/92	4807
1992/93	1051
1993/94	9480
1994/95	–
1995/96	13579
1996/97	28987
1997/98	790
1998/99	17873
1999/00	19543
2000/01	–
Total	128598

Figure 5 Age distribution of community- and hospital-derived influenza isolates, 2000/01



RCGP/ERNVL influenza and RSV detection by PCR from RCGP community-based surveillance

Between 2 October 2000 and 29 April 2001, 729 samples from community-based surveillance were tested by polymerase chain reaction (PCR). Two hundred and fifty-two samples (35%) tested positive for influenza (86 influenza A (H1N1) and 166 influenza B). Forty-three (5.9%) tested positive for respiratory syncytial virus (RSV) (figure 6). The highest positivity rate for influenza detection was in samples derived from children aged from 5 to 14 years (58.1%), and the highest rate for RSV detection was in samples derived from children aged from 0 to 4 years (21.3% positive).

PHLS virological surveillance of influenza⁶

Eighteen laboratories contributed to the scheme during 2000/01. Overall, 120 out of 490 (24%) specimens tested positive for influenza (35 influenza A and 85 influenza B) by DIF and/or culture. Five specimens tested positive for RSV and 14 specimens were positive for other respiratory viruses.

Antigenic characterisation of influenza isolates received by ERNVL in 2000/01

All of the influenza isolates were antigenically similar to either A (H1N1)-A/New Caledonia/20/99-like or B/Sichuan/

379/99-like viruses included in the vaccine composition for 2000/01.

Laboratory reports

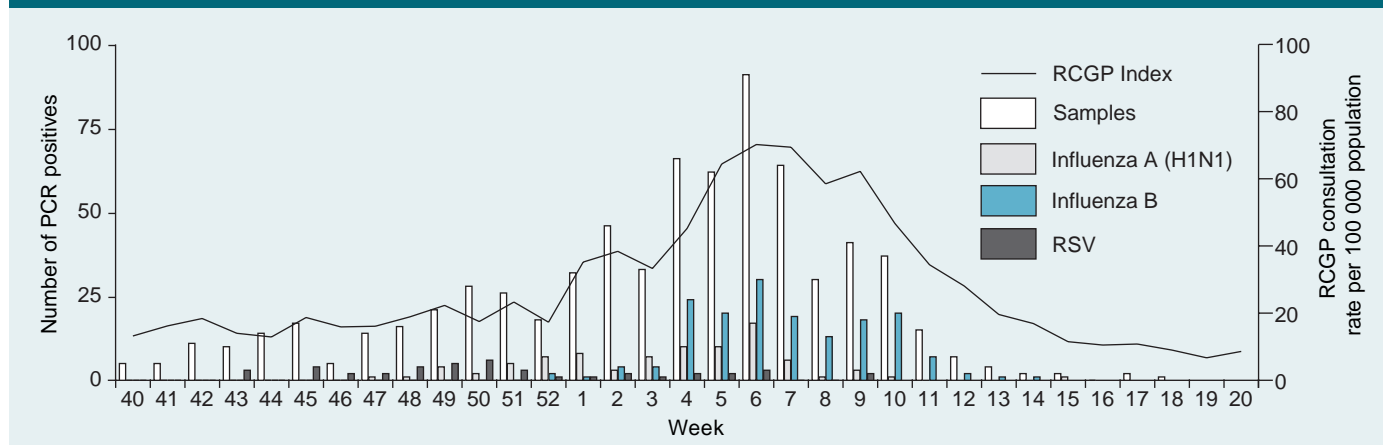
Clinical specimens that yield positive results for influenza or respiratory syncytial virus (RSV) either by single elevated serological titre, antigen detection, seroconversion, or culture at PHLS, NHS and some private laboratories are reported through a voluntary scheme to CDSC each week. Laboratory reports by week of specimen showed that 562 confirmed influenza A infections were identified between weeks 40/00 and 13/01, with the peak in week 04/01 (59 confirmed infections). Eight hundred and two influenza B infections were reported during the weeks 40/99 and 13/00, with the peak in week 09/01 (120 infections).

Between weeks 40/00 and 13/01, 8796 laboratory reports of RSV were made to CDSC, with the peak in week 50/00 (996 reports). Of these, 7074 (80%) were specimens taken from infants aged from 0 to 4 years.

Influenza activity elsewhere

The predominant influenza strain circulating in Europe during 2000/01 was influenza A (H1N1). Activity associated with influenza A (H1N1) was reported until the end of February, after which time influenza B became the

Figure 6 Influenza and RSV detections (by PCR) from RCGP community surveillance, 2000-01 (by week of sample date)



predominant circulating strain in most European countries. Germany, Italy, and Spain remained the exception where isolates of influenza A (H1N1) continued to be reported towards the end of the season.

Reports of influenza C were received from France during week 09/01 (the first since 1961), and sporadic reports of influenza A (H3N2) were made from Spain during week 10/01. Generally, levels of influenza activity remained limited throughout the season. Higher levels were reported in Denmark, France, and Germany over the Christmas and New Year period, but reporting was interrupted by the holiday period. Widespread activity occurred in Sweden from weeks 8 to 13/01. Influenza activity declined and reached low levels across most other parts of Europe at the beginning of March 2001.

Detailed country reports can be obtained from the World Health Organization website at <oms2.b3e.jussieu.fr/flunet/>.

Antigenic characterisation of recent influenza virus isolates worldwide

The majority of isolates characterised worldwide in the 2000/01 season were H1N1 viruses, which co-circulated with influenza B in some countries. The choice of the influenza A (H1N1) vaccine strain for the 2001/02 season, A/New Caledonia/20/99(H1N1)-like virus, the same as in 2000/01, reflects the fact that few antigenic drift variants were isolated. The recommendation of the influenza A (H3N2) vaccine strain, A/Moscow/10/99(H3N2)-like virus, also remains unchanged. Influenza B viruses circulating throughout the world in 2000/01 were characterised as B/Sichuan/379/99-like, with some limited circulation of B/Yamanashi/166/98-like viruses in south east Asia. The choice of B/Sichuan/379/99 as a vaccine strain reflects the requirement to update vaccine components from time to time, even in the absence of significant antigenic drift

Match between vaccine and circulating strains

The match between influenza vaccine components and circulating strains in 2000/01 was good (see above) and the vaccine is likely to have provided substantial protection.

Discussion

Influenza activity in Britain during the 2000/01 season was very low, with levels similar to those seen during 1997/98. The main feature of the season was the co-circulation of influenza A (H1N1) and influenza B with approximately equal numbers of both viruses isolated in samples submitted from the community. Influenza A first appeared in November and influenza B began to circulate in late December and predominated as the circulating strain from the end of January until the end of March. Incidence rates of ILI did not rise appreciably until the turn of the year and remained above baseline activity (50 new episodes per 100 000) between weeks 4 and 12.

During the period when influenza B predominated, clinical rates were highest among older children and adults (aged 5 to 14 years, and 15 to 44 years). The majority of individuals in these age groups will not have received influenza vaccination as they are not in the high-risk groups. Influenza B characteristically produces attack rates that are higher among children compared to adults^{7,8},

and lower levels of excess morbidity and mortality associated with influenza infection due to decreased numbers of influenza associated complications in the elderly.

Consultation rates for acute bronchitis peaked during week 01/01, with rates highest in children aged from 0 to 4 years and adults aged 65 years or over. Laboratory diagnoses of RSV infections also peaked at the same time and are likely to have contributed to levels of acute bronchitis and ILI in young children and the elderly. Despite this, rates of acute bronchitis were generally low throughout the season. *Mycoplasma pneumoniae* infections also remained at low levels during 2000/01. Increased levels are expected during 2001/02 in line with the four-yearly epidemic cycle of this infection.

Many outbreaks of influenza were reported throughout the season. Some schools reported approximately 50% of pupils affected with influenza-like illness and upper respiratory tract infection, although it is not possible to calculate attack rates for these outbreaks due to incomplete case ascertainment. Many of the outbreaks were investigated virologically, highlighting the importance of the MOSA scheme as an early warning system underpinned by characterisation of influenza isolates from community-derived cases.

Influenza activity across Europe coincided with that seen in the UK, with levels reported as 'sporadic' or 'low' in the majority of the fourteen countries contributing to the European Influenza Surveillance Scheme (EISS) throughout the 2000/01 season. In contrast to the situation seen in the UK, influenza A (H1N1) remained the predominant circulating strain across most of Europe until March, when influenza B began to co-circulate.

Surveillance methodology

Many of the sources of data used for influenza surveillance are well established. Surveillance data traditionally focused on clinical consultations with GPs and virological confirmation through laboratory reports. In the last two years, however, additional sources of data such as NHS Direct and molecular technologies have been introduced to enhance the surveillance data collected.

Problems in interpretation of NHS Direct data have been encountered due to expansion of the service between October and December 2000, excess calls over Christmas (when other health services are closed), and the continuing rise in the baseline total call rate. Call rates to NHS Direct ranging between 100 and 200/100 000 week are much less than contact rates in general practice which average 8000/100 000 per week.

The timeliness of NHS Direct data, and its ability to mirror other surveillance systems, may offer the opportunity for further surveillance of influenza during the winter of 2001/02.

Enhanced surveillance of influenza began in Northern Ireland during the 2000/01 season, coordinated by the Communicable Disease Surveillance Centre (Northern Ireland)⁹. Sixteen GP practices provided weekly information on the number of consultations for influenza and ILI, while a subset took nose and throat swabs for enhanced virological monitoring. As this is the first year of this scheme baseline values cannot be determined, and there is no previous data available for comparison.

ERNVL tested community derived specimens from RCGP sentinel surveillance practices for influenza and RSV using PCR molecular methods for the first time in 2000/01, and increased the yield of positive results. An overall influenza positivity rate of 38.6% was obtained using PCR, compared with 14% using isolation alone, demonstrating the increased sensitivity of this methodology. The use of isolation as a detection method, however, remains essential for identifying circulating and new strains through virus typing. This is not possible using PCR.

The PHLS virological surveillance of influenza scheme will be enhanced during 2001/02 as part of the continuing development of the surveillance methodology. The case definition for inclusion in the study has been widened to include acute bronchitis, and the number of swabs collected from patients presenting to GP practices will be increased. Denominator data will also be collected from a subset of the participating practices.

A study of acute respiratory admissions made through accident and emergency departments is due to be piloted during the 2001/02 season. This study aims to address the current gap in surveillance data on hospital admissions.

Additionally, data from the PHLS will be used in the continuing pilot study *Forecasting the Nation's Health* being undertaken by the Health Forecast Unit of the Met Office.

National influenza vaccination campaign

Following a change in UK policy for influenza immunisation for autumn 2000, immunisation was recommended for all people aged 65 years and over in addition to those at high risk in younger age groups. The Department of Health set a target of 60% uptake in all health authorities, and for the first time vaccine uptake was monitored during the season. Figures from all 99 health authorities in England to the end of December 2000 showed that the national uptake rate among those aged 65 years and over was 65%.

Timely monitoring of vaccination uptake among patients aged 65 years or over will be undertaken by the PHLS Communicable Disease Surveillance Centre on behalf of the Department of Health for the 2001/02 season.

Vaccine recommendations

The recommended components for the 2001/02 vaccine for the northern hemisphere are¹⁰:

A/Moscow/10/99(H3N2)-like virus*

A/New/Caledonia/20/99(H1N1)-like virus

B/Sichuan/379/99-like virus**

* A/Panama/2007/99 is an A/Moscow/10/99(H3N2)-like virus

** The most widely used vaccine strain is B/Sichuan/379/99

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