

Surveillance reports

OUTBREAKS OF INFLUENZA AND INFLUENZA-LIKE ILLNESS IN SCHOOLS IN ENGLAND AND WALES, 2005/06

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In England and Wales, clinical reports from primary care showed that influenza activity for the season 2005/06 only rose above the base line for four weeks during February 2006. However, outbreaks of influenza-like illness and/or gastrointestinal infection in schools began to be reported to the Health Protection Agency, Centre for Infections in early January 2006. To quantify the type, size and the spread of these outbreaks a reporting form was distributed to local Health Protection Units in England and to Wales for retrospective and prospective weekly completion. Between weeks 48/05 and 11/06, a total of 688 school outbreaks were reported, including 658 outbreaks of influenza-like illness with or without other symptoms. The remaining 30 outbreaks listed as gastrointestinal only were excluded from the present analysis. Influenza B was confirmed in 70 outbreaks where testing took place. 61% of the outbreaks were reported from primary schools for children aged 4-11 years. This large scale outbreak in school children with flu-like illness across England and Wales was not picked up by most of the routine surveillance schemes, therefore, we believe that a school absentee monitoring and reporting system may be needed to give an early warning of increased influenza activity, especially for the mild form of the disease caused by influenza B virus.

Introduction

An analysis of the hospital- and community-based data on influenza activity in England and Wales during 2005/2006 showed a season of relatively low activity. However, from week 03/06 the Centre for Infections (Cfi) of the Health Protection Agency (HPA) started to receive reports of respiratory outbreaks involving large

numbers of school children. The magnitude and number of school outbreak reports were not reflected in the weekly data from the routine influenza surveillance systems, nor were these reports collected on a routine basis. In order to assess the type, size and extent of these school outbreaks, the Cfi influenza surveillance team requested that national weekly reporting of outbreaks through HPA Health Protection Units be carried out.

Methods

A weekly reporting form was distributed through regional epidemiologists to all local Health Protection Units (HPUs) so that data could be systematically collected and collated centrally. The form was sent out during week 6 (week commencing 06/02/2006) and the data collection activity finished in week 12 (week commencing 20/03/2006). The HPUs were requested to use this data collection form to report all respiratory outbreaks that occurred in any type of school in England and Wales, including infant schools or nurseries (children aged younger than 5 years), primary schools (aged 4-11 years), secondary schools (aged 11-18 years), boarding schools (aged 2 -18 years) and special education needs (SEN) schools (aged 2 - 19 years). The completed forms were to be returned to the Cfi influenza surveillance team every Monday, with data covering the previous week. In addition, retrospective data was requested, as were updates of outbreaks previously reported. The reporting form included the name and address of the school where the outbreak occurred, the number and age range of the enrolled and affected children, the date of onset of the first case in the outbreak, the range of symptoms reported, the average duration of illness and the results of laboratory analysis of any respiratory

TABLE 1

Geographic distribution of respiratory outbreaks in schools in England and Wales during the 2005/06 influenza season (N=658)

HPA region	Number of Outbreaks (%)	Number of Students at Risk in Schools Reporting Outbreaks (%)	Number of Cases (%)	Overall Attack Rate (%)
West Midlands	221 (33.6)	83228 (37.5)	19189 (36.0)	23.1
South West	128 (19.5)	41339 (18.6)	7251 (13.6)	17.5
South East	122 (18.5)	33300 (15.0)	13819 (25.9)	41.5
North East	70 (10.6)	24396 (11.0)	4436 (8.3)	18.2
London	45 (6.8)	6142 (2.8)	956 (1.8)	15.6
Yorkshire and Humberside	41 (6.2)	21430 (9.7)	3124 (5.9)	14.6
East of England	12 (1.8)	5651 (2.5)	2329 (4.4)	41.2
East Midlands	8 (1.2)	1980 (0.9)	440 (0.8)	22.2
North West	7 (1.1)	2762 (1.2)	1239 (2.3)	44.9
Wales	4 (0.6)	1590 (0.7)	567 (1.1)	35.7
Total	658 (100)	221818 (100)	53350 (100)	24.1

or other samples taken during the outbreak. Data were received as an excel file and analysed weekly by region of report. Results were included in the HPA weekly flu bulletin and were made available on the HPA website for health professionals and the general public.

Results

A total of 688 school outbreaks of influenza-like illness (ILI) and/or diarrhoea and vomiting were reported across England and Wales between weeks 48/05 and 11/06, the majority of them occurring from mid-January 2006 onwards. Among the outbreaks, 201 (29%) were reported with respiratory symptoms only, 353 (52%) with respiratory symptoms and diarrhoea and/or vomiting, 30 (4%) with diarrhoea and/or vomiting only, and 104 (15%) as ILI outbreaks without listing the symptoms. The 30 outbreaks reported with symptoms of diarrhoea and/or vomiting only are excluded from the following analysis, leaving 658 outbreaks of ILI with or without other symptoms.

There was considerable variation in the number of ILI school outbreaks reported from the nine HPA regions in England, and the one in Wales, probably due to the voluntary nature of the reporting scheme. The West Midlands reported the highest number of outbreaks (244), whereas the smallest number was reported from Wales (4) (Table 1). The total number of cases associated with the outbreaks was 54,786 (from 440 in the East Midlands to 20,337 in the West Midlands; mean: 5,479, median: 2,726).

Outbreaks occurred in different types of schools but mainly in primary schools (61%, Figure 1). The most affected population was children under 11 years of age (69% of the outbreaks and 51% of the total number of cases). The mean attack rate for the outbreaks in which the number of cases and the school population size were both reported was 23% (n=553; median: 20%; range: 1% - 94%).

Taking into consideration the week of onset, it was found that the number of reports started to increase significantly from week 02/06 onwards, peaking in week 05/06 when 196 outbreaks were reported, and decreasing to 64 reports in week 06/06. In comparison, the overall consultation rates for influenza and ILI obtained from the Weekly Returns Service of the Royal College of General Practitioners (RCGP*) which is the main influenza surveillance scheme for England and Wales, for the same period, reached a peak in week 07/06 that is two weeks later than the number of school outbreak reports (Figure 2a).

The school outbreak reports peaked in week 05/06 in all regions, whereas the RCGP rates were highest in the northern region in week 03/06 (two weeks ahead), in the central region in week 06/06 (one week behind) and in the southern region in week 07/06 (two weeks behind).

The standard age groups used in UK flu surveillance are 0-4 years, 5-14 years, 15-44 years, etc. The national surveillance data for the age group 5-14 years, which are the closest match to the schools' data, were examined to check for additional evidence of the rise in influenza activity in schoolchildren. RCGP consultation rates in the age group 5-14 indeed peaked in week 06/06 and were higher than for any other age group overall in 2005/06. Data from the national health advice telephone line (NHS Direct) showed that although cold/flu calls in all age groups peaked in week 06/06, calls in the 5-14 years age group were highest compared with all other ages. Call rates for fever among 5-14 year olds peaked in

FIGURE 1

Respiratory outbreaks by type of school in England and Wales during the influenza season 2005/06 (N=658)

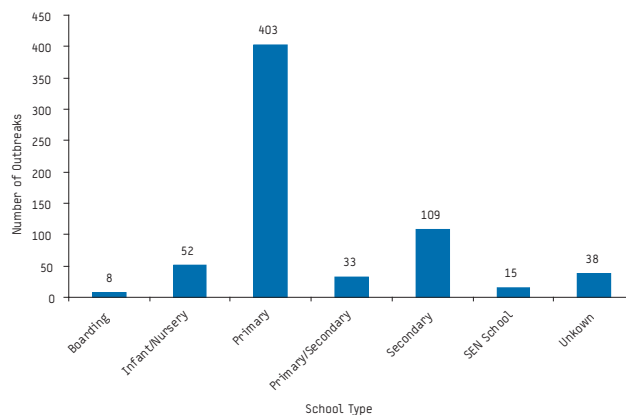


FIGURE 2 A

Comparison of RCGP* rate with distribution of outbreaks in England and Wales influenza season 2005/06

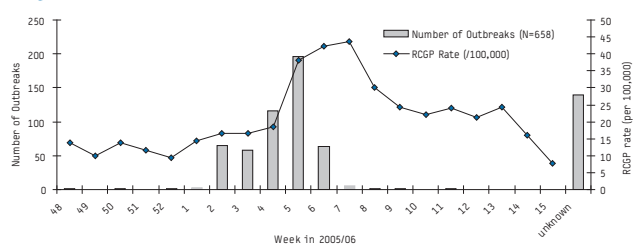
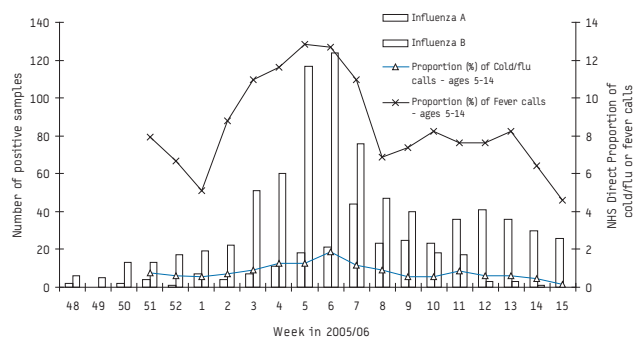


FIGURE 2 B

NHS Direct call rate and virological date in England and Wales influenza season 2005/06



weeks 05/06 and 06/06 and showed the greatest symmetry with the school outbreak reports (Figure 2b).

Laboratory results

Influenza B was confirmed in all 70 outbreaks in which testing took place. Two outbreaks had both influenza A and influenza B confirmed. The predominant virus strain identified in samples from six of the outbreaks was influenza B/Hong Kong/330/2001-like virus [1] the same strain as that detected in other community settings during the 2005/06 season. The virological surveillance data [2] collected for the 2005/06 season identified influenza B as the dominant circulating influenza virus (395 out of 530 samples characterized - 74.5%). The detection of influenza B virus increased markedly from week 03/06, peaking in weeks

05/06 and 06/06 (Figure 2b). Of the influenza B viruses further characterized, 99% were antigenically similar to the influenza B/Hong Kong/330/2001-like virus. These data support the results obtained through school outbreak reporting, showing influenza B as the cause of many of the school outbreaks, and are compatible with the mild symptoms reported for the majority of children and the lack of a significant rise in overall RCGP consultation rates over the same time period. It is of note that the 2005/06 influenza B strain identified in England and Wales was also dominant in the influenza season of New Zealand between April–September 2005 [3,4] and was responsible for an influenza B epidemic in school age children in the North Island, New Zealand.

Discussion

The large number of reported school outbreaks of respiratory infection was the most significant feature of the 2005/06 influenza season in England and Wales. This occurred despite the overall GP consultation rates for influenza and influenza-like illness rising above the baseline level of 30 per 100,000 population for four weeks only, from week 05/06 until week 08/06, and peaking at 43.7 per 100,000 during week 07/06 [2,5]. There were also anecdotal reports of schools in the north of England being affected by influenza already in early December 2005, well before the more widespread outbreaks in the rest of England and Wales were reported in January and February. Influenza B was the dominant virus in circulation during the 2005/06 season and this strain is known to disproportionately affect younger age groups but is clinically less severe than influenza A infection. The age specific consultation rates between weeks 04/06 and 08/06 were highest in 5-14 year-olds, reflecting the likelihood that many of the reported outbreaks were due to influenza B infection.

Many of the school outbreaks were reported to have been complicated by the simultaneous symptoms of diarrhoea and vomiting. Together these two conditions caused large scale school disruptions and in some cases, temporary school closures. Although influenza B is a mild illness, some hospitalisations of children were separately reported, as were three deaths. School outbreaks in the southern hemisphere earlier in 2005 also recorded some high morbidity among children in New Zealand [3,4].

The school outbreaks attracted media attention nationally and locally, particularly in the West Midlands where the number of outbreaks was highest, which led to increased ascertainment of data in some regions. In contrast, some other regions reported that information on local outbreaks was difficult to obtain and so could not comply with the weekly request for information. The fact that the routine national surveillance schemes using general practice consultation data failed to detect a rise in overall influenza activity during the period of the school outbreaks meant that a significant level of influenza activity remained unnoticed. This has implications for the effectiveness with which the current surveillance system is able to give early warning of an impending influenza season or even the first wave of a future pandemic. Syndromic surveillance, such as that practised by NHS Direct with data obtained through nurse led telephone calls, may now be of greater value as an early warning system than primary care surveillance in situations where people are mildly ill or no longer choose to seek medical care and advice directly from their general practitioner.

The HPA is currently exploring the feasibility of collecting and integrating data from schools on outbreaks and illness absenteeism

with the Department for Education and Skills and local HPUs, with a view to establishing within each region an early warning system of increased flu activity at the local level. The detection of a large or sudden increase in non-authorised absenteeism levels in sentinel schools through a weekly reporting system could act as the trigger for investigations into whether influenza might be the cause. These investigations would provide information early in the season, and during the season, of circulating respiratory viruses, changes in viral type and their impact on school age children. Local health protection units would have the opportunity to follow up outbreaks in these schools in real-time, and thus gather useful data at the local level that would contribute to the overall surveillance picture at the national level. The data would be obtained from age specific cohorts rather than individual patients and should provide added value over and above the data provided by consultation rates or calls to NHS Direct, since it does not rely on children seeking medical care at the individual level.

There are many limitations to this report of outbreaks in schools. As mentioned earlier, data collection was voluntary, and underreporting was in evidence. Although all HPU's were asked to report to us the information defined in the data collection form, they frequently only responded once they received an outbreak report from a school, and did not actively contact schools in their area to see whether an ILI outbreak was occurring. However, despite the underreporting, we still received an exceptionally large number of reports of school ILI outbreaks. We believe this provided a good indication that a large scale influenza B infection occurred across the country when considered together with other syndromic and virological surveillance data.

A new school surveillance system is now being piloted in England to investigate whether non-authorised school absenteeism data can be used as a proxy for influenza activity within the school setting. If successful, the data will be used as an early warning detection system for seasonal influenza and will be incorporated into weekly national surveillance for further assessment of the impact and burden of influenza in the community at large.

Conclusion

- ▶ Large scale school outbreaks of flu-like illness, most likely attributable to influenza B, occurred during the 2005/06 influenza season in England and Wales;
- ▶ The most affected population associated with these reported outbreaks were school children aged 11 years or younger, consistent with peak rates in children aged 5-14 years from RCGP and NHS Direct data;
- ▶ This increased flu activity was not detected in time or magnitude by the established national routine flu surveillance systems operating in England and Wales;
- ▶ The incorporation of data from schools on rates of absenteeism and outbreak reporting may provide an early indication of the start of the influenza season in future.

Acknowledgements

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