

The protective effect of influenza vaccine in a mixed influenza A and B epidemic in a boys' boarding school

J. H. D. BRISCOE, MRCGP

Medical Officer, Eton College, Windsor

SUMMARY. A mixed influenza A and B epidemic, which affected 30 per cent of the boys in a boarding school during the early part of 1976 is described. Virological findings indicate that most cases were due to influenza viruses similar to A/Victoria/75.

The incidence of influenza was similar in all blocks in the school, but very variable in the boys' houses. The four-day half-term holiday helped to limit the epidemic.

Eighty-six per cent of the boys had received an influenza vaccine containing the A/Scotland and A/Port Chalmers antigens.

Influenza vaccination was of definite value, giving a protection rate among vaccinated boys of 36 per cent. Vaccinated boys who developed influenza had a shorter illness than unvaccinated boys.

Introduction

RECENT experience in boarding schools confirms that influenza vaccination is often worthwhile (Turtle, 1968; Hoskins *et al.*, 1973; Briscoe, 1975; Smith, 1975). At Eton College since 1966 vaccination against influenza has been carried out annually using the hypojet gun, except in 1973 when an intranasal vaccine was given. During the period 1966 to 1974 there were three epidemics during term-time. Although on each occasion the vaccine given the previous autumn had not contained the subsequent causative virus, protection rates of 12, 47, and 23 per cent were achieved. A further epidemic, which occurred in 1976, is reported here with evidence that vaccine containing the A/Scotland and A/Port Chalmers antigens produced a valuable degree of protection against the A/Victoria influenza virus.

© *Journal of the Royal College of General Practitioners*, 1977, 27, 28-31

Vaccination

Influenza vaccination was arranged for the school on 7 October 1975. The vaccine, which contained A/Scotland/840/74 400 i.u., A/Port Chalmers/1/73 400 i.u. and B/Hong Kong/8/73 360 i.u., was administered by hypojet gun in a dose of 0.5 ml. Of a total of 1,251 boys aged 12 to 18 years, 1,078 (86 per cent) were vaccinated.

Epidemiology of influenza 1975/1976

Sporadic cases of influenza occurred in England from November 1975 onwards, but there were relatively few cases among the general population until mid-January 1976. Reports to the Public Health Laboratory Service showed that the national epidemic reached a peak in mid-February 1976, and slowly declined to die out towards the end of April. Both influenza A and B viruses were circulating at the same time; about 75 per cent of the influenza is estimated to have been due to A strains. The prevalent strains of influenza A virus differed antigenically from the A/Port Chalmers/74 and A/Scotland/74 strains of the winter 1974/1975. Most of the isolates resembled A/Victoria/75, a virus prevalent in the southern hemisphere in the latter part of 1975, but a new strain designated A/England/864/75 was also isolated, mostly in the early winter. The influenza B strains remained similar to the B/Hong Kong/5/73 viruses of the previous winter.

The epidemic

The daily total of absent boys rose above the usual top figure of 20 on 22 January 1976 (Figure 1a). A sharp rise began on 27 January and reached a peak of 119 boys on 7 February. The figure had fallen to 59 on 19 February, the day before the half-term holiday.

Sixty-two boys failed to return from the holiday on 23 February but by 7 March absence was down to normal. There followed a small second wave in the epidemic with a peak on 11 March.

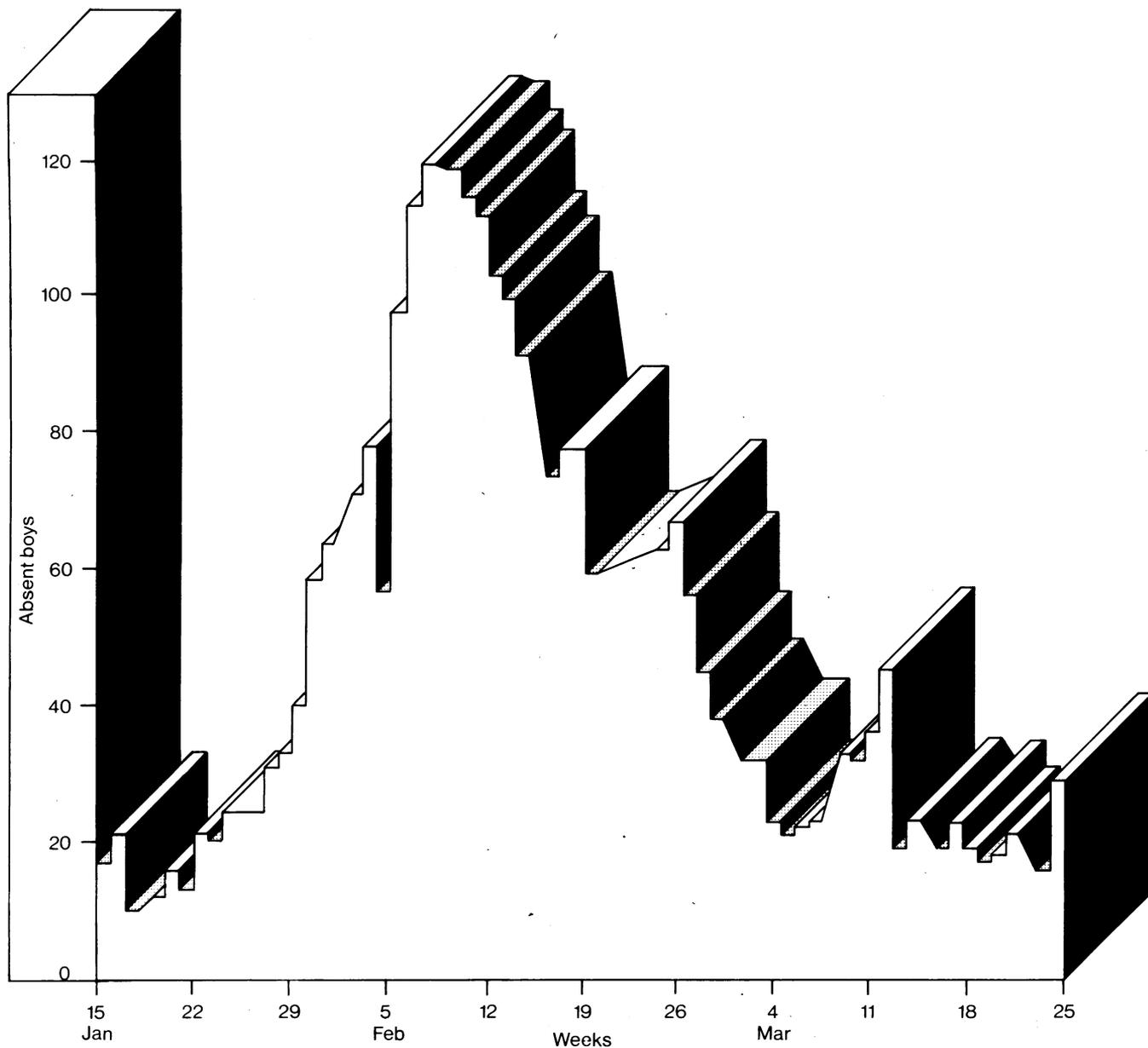


Figure 1a. Daily total of absent boys. (The interrupted line indicates the four-day half-term holiday.)

The first case of influenza occurred on 17 January, three days after the beginning of term. The daily incidence of new cases rose to a peak of 27 on 6 February and thereafter declined (Figure 1b). Sporadic cases occurred until 18 March, five days before the end of term.

Influenza progressed simultaneously through all the blocks in the school. (The work of the school is done in six 'blocks' - from F up to A. Boys normally move from block to block each September). It affected a similar proportion of boys in each block (Table 1). Influenza occurred in every boys' house but the incidence varied widely from a single boy to 32 boys in one house. This pattern has been observed in previous epidemics and no satisfactory explanation has been found.

Of a total of 1,231 boys, 372 (30 per cent) developed influenza.

Table 1. Incidence of influenza in the various blocks.

	Blocks					
	A	B	C	D	E	F
Total number of boys	8	256	241	214	246	266
Boys with influenza	1	65	77	55	82	92
Percentage of total	13	25	32	26	33	35

The half-term holiday

The half-term holiday lasted from 20 to 23 February. The peak incidence of new cases occurred on 6 February

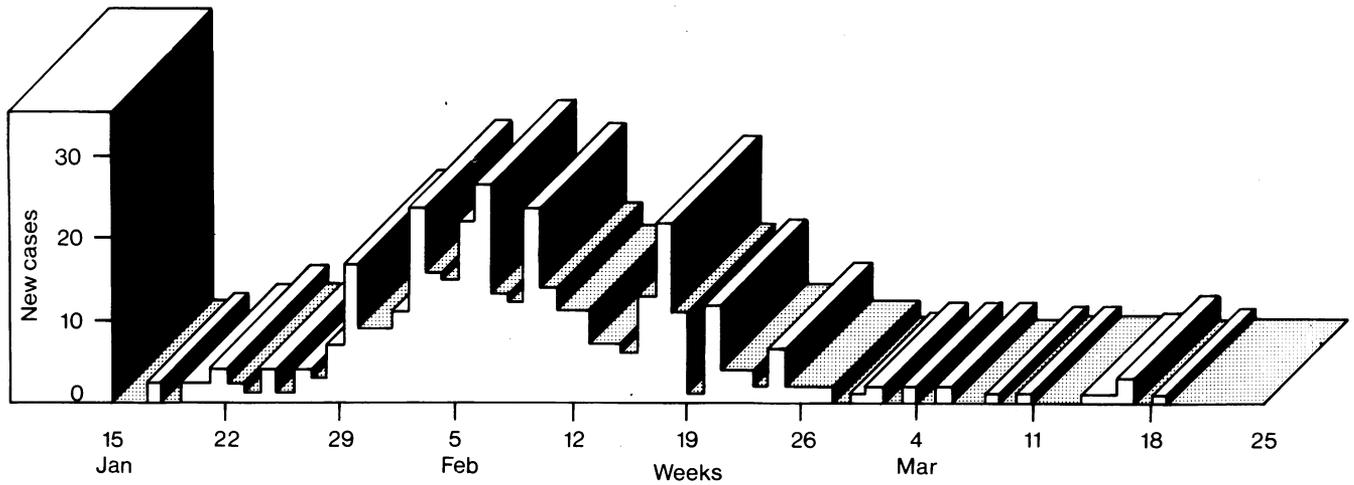


Figure 1b. Daily incidence of new cases of influenza.

but a second wave of new cases gave a peak of 21 on 17 February, three days before the half-term holiday (Figure 1b). Some houses were just starting to have their first cases at this time and it is likely that the holiday cut short the epidemic. All 26 houses had cases of influenza before the holiday, but after the holiday there were no further cases in 15 houses.

Causative organism

Throat swabs and samples of acute and convalescent serum were taken from eight boys who were early victims in the epidemic. Six boys showed evidence of infection with influenza A, and one with influenza B. In the eighth boy no evidence of influenza infection was found.

The influenza A virus in each case was identified as A/England/76, which was similar to A/Victoria/3/75. The A/Victoria/3/75 viruses, although antigenically related to the A/Port Chalmers and A/Scotland strains in the vaccine, can be distinguished from these strains. No virus was isolated from the boy infected with influenza B, so the strain could not be identified.

There were, therefore, two different types of influenza virus affecting the school at the same time, although most infections were probably due to influenza A virus. Similar epidemics due to two different

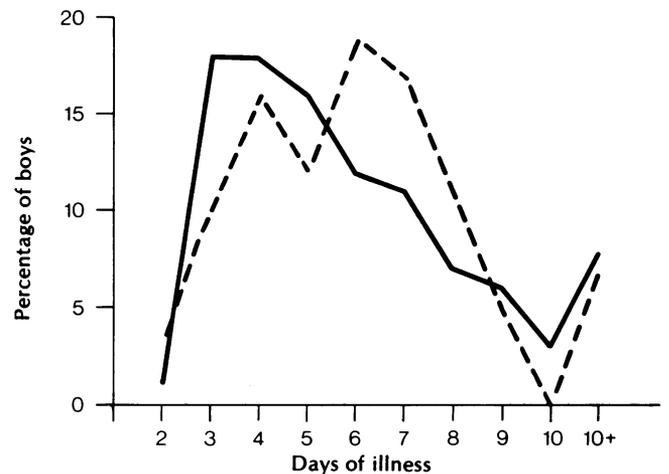


Figure 2. Length of illness of vaccinated (continuous line) and unvaccinated (interrupted line) boys.

types of influenza virus circulating at the same time have been reported from Winchester College by Smith (1975) and from Christ's Hospital by Hoskins and his associates (1976). Thirteen boys had two separate attacks and they may have suffered the two types of influenza successively.

Effects of vaccination

In December 1975, 130 boys left the school, leaving 1,121 boys whose vaccinal state was known; 110 new boys joined the school in January 1976, of whom 47 subsequently developed influenza, but as the vaccinal state of these boys was unknown all have been excluded from Table 2.

Although the vaccine was not tailored to the virus responsible for the subsequent epidemic, it conferred considerable benefit on the vaccinated boys. The dif-

Table 2. Attack rates among vaccinated and unvaccinated boys.

	Vaccinated	Unvaccinated
Total number of boys	970	151
Boys with influenza	261 (27 per cent)	64 (42 per cent)

ference in the attack rate in the boys who were vaccinated (27 per cent) and those who were unvaccinated (42 per cent) is significant ($\chi^2 = 14.46$; $p < 0.001$). Instead of 407 cases expected (from the attack rate of 42 per cent in unvaccinated boys) there were only 261 cases among 970 vaccinated boys. In other words for every hundred cases expected there were only 64, so that 36 were protected—a protection rate of 36 per cent.

The length of illness, defined as the number of days a boy was absent from school, was known for 273 vaccinated and 63 unvaccinated boys. Boys who had second attacks are counted twice. The period of illness in vaccinated boys was shorter by about two days (Figure 2). Smith (1975) also noted a shorter illness in vaccinated boys.

Second attacks of influenza occurred in 13 boys (three per cent); nine of these were vaccinated, two unvaccinated, and two were new boys whose vaccinal state was not known.

References

Briscoe, J. H. D. (1975). *Practitioner*, 214, 821-826.
 Hoskins, T. W., Davies, J. R., Allchin, A., Miller, C. L. & Pollock, T. M. (1973). *Lancet*, ii, 116-120.
 Hoskins, T. W., Davies, J. R., Smith, A. J., Allchin, A., Miller, C. L. & Pollock, T. M. (1976). *Lancet*, i, 105-108.
 Smith, T. C. G. (1975). *Practitioner*, 214, 827-831.
 Turtle, P. de Bec (1968). *Practitioner*, 200, 254-259.

Acknowledgements

I should like to thank the house matrons whose records have made this survey possible. I am also indebted to Dr J. W. G. Smith, of the Public Health Laboratory Service, Colindale, for his encouragement and assistance in the preparation of this report.

Concealing alcoholism

Two psychiatrists from an addiction unit in Chester studied the work record of 73 male alcoholics and the diagnosis on 149 medical certificates in which alcoholism was mentioned only four times and DTs once. The diagnosis given in 16 per cent was 'hospitalization', some form of respiratory disease 14 per cent, digestive disease, 14 per cent, accident, 10 per cent, and something like 'strained back', 4.7 per cent, among others.

On average each alcoholic lost 122 working days a year owing to sickness (86.1 days certified) or unemployment, and the average payment was £252.52, those without a job on admission having been paid £398.48, and those admitted with a job £171.79. It is possible certain of the subjects' doctors avoided labels denoting alcoholism under the mistaken impression that this illness did not qualify for sickness benefit.

Reference

Saad, E. S. M. & Madden, J. S. (1976). *British Journal of Psychiatry*, 128, 340-345.



**COLLEGE
ACCOMMODATION**

Charges for college accommodation are reduced for members (i.e. fellows, members and associates). Members of overseas colleges are welcome when rooms are available. All charges for accommodation include breakfast and are subject to VAT. A service charge of 12½ per cent is added. Members are reminded that children under the age of 12 years cannot be admitted and dogs are not allowed.

From 1 January 1977, charges are:

	Members	Others
Single room	£5	£9
Double room	£9	£14
Flat 1	£11	£14
	(£70 per week)	(£90 per week)
Flat 3	£12	£15
	(£75 per week)	(£95 per week)

Charges are also reduced for members hiring reception rooms compared with outside organisations which apply to hold meetings at the College. All hirings are subject to approval and VAT is added.

	Members	Others
Long room	£30	£40
Damask room	£20	£30
Common room and terrace	£20	£30
Kitchen	—	£10
Dining room	£10	£10

Enquiries should be addressed to:

**The Accommodation Secretary
 The Royal College of General Practitioners
 14 Princes Gate, Hyde Park
 London SW7 1PU.
 Tel: 01-584 6262**

Whenever possible bookings should be made well in advance.