

## 'Red 'flu': a study of an epidemic in a girls' boarding school in February 1978

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**SUMMARY.** All the girls at a boarding school who presented with symptoms of influenza were interviewed and examined. Their symptoms and signs were recorded and related to age, date of last menstrual period, and previous influenza immunization.

The age of the girls had no influence on the incidence of disease, nor did the number of girls in each form. However, the attack rate among those not immunized was 61 per cent and those not immunized 71 per cent. There was a highly significant variation in the incidence of influenza in relation to the menstrual cycle.

### Introduction

**A**DVANCE publicity, awareness of presenting symptoms, and simultaneous presentations of these symptoms in several pupils enabled us to study from the outset an epidemic of Influenza Type A in a girls' boarding school.

The particular strain was later confirmed by both virological and serological studies to be A/Eng/865/78, which is similar to A/USSR/90/77 (H<sub>1</sub>N<sub>1</sub>). This information was obtained from nasal and throat swabs and blood specimens taken at random from cases occurring during the first 36 hours of the epidemic.

### Aim

Our aim was simply to study an epidemic of Influenza Strain H<sub>1</sub>N<sub>1</sub> which was interesting because it was the first influenza strain to repeat itself in the last 20 years.

### Topography and distribution

Total number of schoolgirls	248
number of boarders	223
number of day girls	25
Age range: 11½ to 18½ years.	

The school is divided into six houses, of which the most senior and most junior houses are geographically separate. Senior girls eat separately at lunchtime, but otherwise all girls eat in the communal refectory. The dormitories in these houses sleep four or five girls, all from the same form.

The school is in parkland adjacent to a village of 700 inhabitants. The nearest city is six miles away and most day girls come from within this area.

### Method

All girls boarding at the school who presented with symptoms were interviewed and examined by the resident school nursing sister and one of us (W.H.S.), a vocational trainee in general practice.

The patients were isolated initially in the school sanatorium of 14 beds but later, owing to the large numbers affected, in dormitories of the house adjacent to the sanatorium.

Signs and symptoms were recorded and particular attention was paid to age, date of last menstrual period, previous influenza immunization, and house and form groups. A record of treatment was also kept.

### Results

#### Signs and symptoms

Seven symptoms were elicited. Table 1 shows the severity and nature of each. Figure 1 shows the percentage incidence.

Very few signs were found, but almost all girls had a

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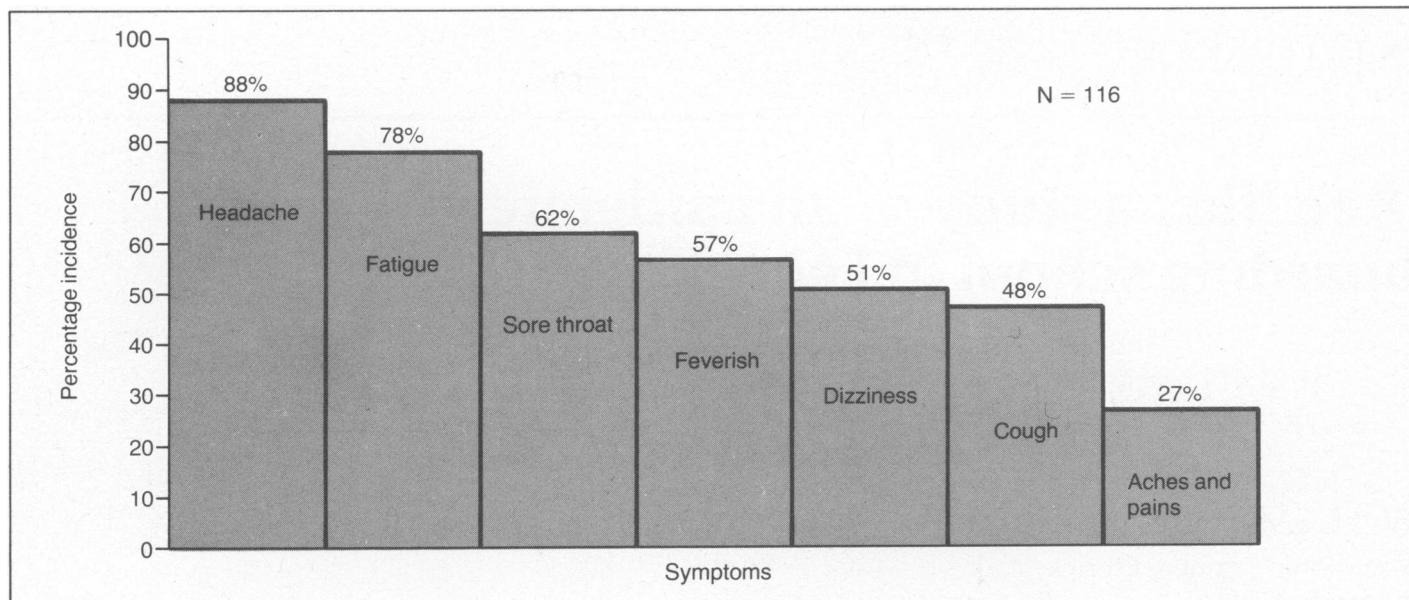


Figure 1. Percentage incidence of symptoms.

Table 1. Nature and severity of symptoms.

Symptoms	Severity				Total number
	Mild	Moderate	Severe	Very severe	
Headache	33	69	2	—	104
Fatigue	27	57	5	—	89
Sore throat	33	39	—	—	72
Feverishness	30	35	1	—	66
Dizziness	36	21	2	—	59
Cough	46	8	1	1	56
Aches/pains	22	9	1	—	32

N=116.

mild erythema of the tonsillar pillars which was well demonstrated and centripetal in distribution.

Pyrexia was recorded in 79 girls; of these, seven had temperatures above 40°C (103°F) on at least one occasion.

Of interest was the fatigue seen during the illness, followed by a voracious appetite of the younger girls in the convalescent phase.

Post-influenzal depression was not noticed. Indeed the converse was true in that a holiday atmosphere was noticeable for the major part of the epidemic.

**Duration of symptoms**

Eighty-two girls were followed up, and Figure 2 shows duration of symptoms. Recovery was taken to be complete when all symptoms had disappeared. Girls who took longer to recover suffered the same symptoms, which were, however, more severe and consequently slower to resolve.

Thus 90 per cent of patients recovered in four days or less.

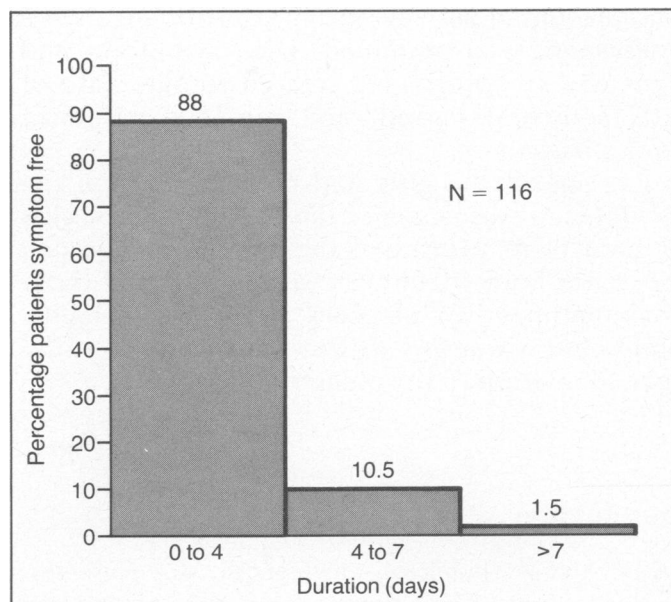


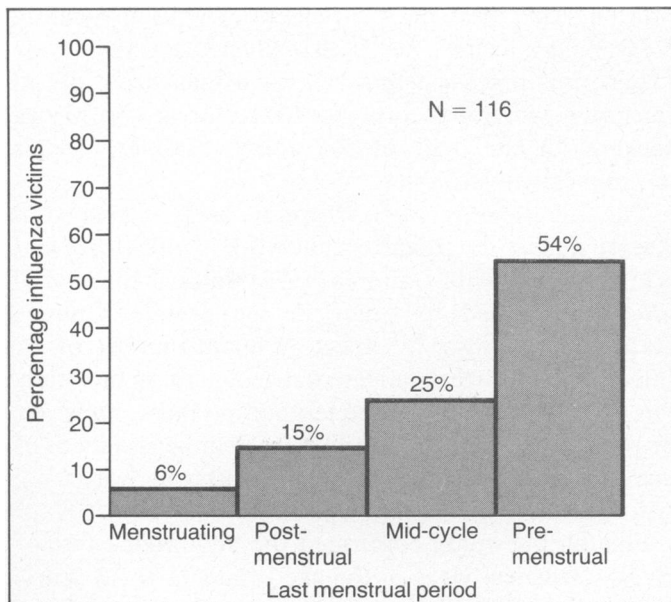
Figure 2. Duration of symptoms.

**Last menstrual period**

All girls were questioned about the timing of their menstrual cycle at the onset of symptoms (assuming the menarche had been achieved).

Answers were divided into four categories:

- 1) Premenstrual—expecting a period that week;
- 2) Postmenstrual—finishing menstruating the previous week;
- 3) Menstruating—at time of symptoms;
- 4) Mid-cycle—none of the above.



**Figure 3.** Incidence of influenza and timing of menstrual period.

Figure 3 shows the results from 116 girls.

The results when analysed showed a highly significant variation from the expected distribution ( $\chi^2 = 61.517$ ; 3 d.f.;  $p < 0.001$ ).

**Previous influenza immunization**

Fifty per cent of pupils had been immunized, following parental consent, the previous autumn to Influenza A (Victoria strain), and a comparison was drawn between immunization and H<sub>1</sub>N<sub>1</sub> attack rate. The attack rate of those immunized was 71 per cent and those not immunized, 61 per cent.

Comparison of age group/immunization also showed no correlation.

Incidentally, all pupils immunized who offered blood for serology were found to have raised and constant titres to Influenza A (Victoria).

**Age**

Pupils ranged from 11½ years to 18½ years.

Table 2 shows the total number of girls born in each year from 1959 to 1967 and percentage incidence of influenza.

The value of  $\chi^2$  obtained from these figures confirms that age group has no significant bearing on the incidence of the disease.

**Form groups**

The school is divided into 11 forms by age and attainment.

Table 3 shows the number of girls in each form, the percentage incidence of influenza, and age range of the girls in the form.

Once again the value of  $\chi^2$  supports the postulate that

**Table 2.** Total number of schoolgirls born between 1959 and 1967 and percentage incidence of influenza.

Age	Year of birth	Total number of girls	Percentage incidence of influenza
19	1959	4	25
18	1960	19	40
17	1961	31	66
16	1962	48	66
15	1963	48	60
14	1964	40	72
13	1965	39	78
12	1966	17	75
11	1967	2	50

N=116.

**Table 3.** Number and age range of girls in each form, with percentage incidence of influenza.

Form	Total number of girls	Age range	Percentage incidence of influenza
UVI	20	17 to 18	15
LVI	22	16 to 17	82
VA	29	15 to 16	66
VB	29		66
VC	22		50
VD	21		61
IWA	22		73
IVB	20	13 to 14	70
IVC	18		67
IVD	20	12 to 13	70
IVE	25		84

N=116.

incidence and form groups are independent.

**Treatment**

All girls were given symptomatic treatment, that is, antipyretics, fluids, and bed rest.

Only three girls required antibiotic therapy. All had clinical chest infections. One of these was a known asthmatic.

**Discussion**

Initially we had two aims in mind: first to carry out a simple exercise in collecting and presenting clinical material when given such a splendid opportunity (a relatively closed community and advance publicity) and secondly, to present a factual account of a 'Red 'flu' epidemic. However, when the results were collected and analysed, several interesting points were discovered.

When the signs, symptoms, and duration of the disease were studied closely it became apparent that this particular viral infection followed a relatively benign and limited course, with no apparent sequelae and very few complications, which is interesting, when one remembers the dramatic publicity and anxiety which

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followed the press announcements of this impending epidemic last winter. Was it all really necessary?

It is now proposed that this particular strain of Influenza A virus be incorporated into the new influenza vaccine. In the light of the above findings, is this economically justifiable?

The significantly high inception rate of this viral disease during the premenstrual week is interesting and is in agreement with Dalton's (1977) findings that "viral infections tended to occur in the premenstruum". Statistically one would expect an equal number of influenza victims in each menstrual group but in our study this is definitely not so. The temptation must, however, be resisted to suggest a causal effect on the incidence of this disease; correlation and causation are not synonymous.

Finally, our study confirmed the high attack rate of H<sub>1</sub>N<sub>1</sub> Influenza virus in the age group 11 to 18 years. However, the incidence, severity, and duration were not related to dormitory groups, form groups, or geographical distribution of the houses.

### Reference

Dalton, K. (1977). *The Premenstrual Syndrome and Progesterone Therapy*. p. 148. London: Heinemann Medical Books.

### Acknowledgements

Our thanks are due to the Headmistress, Miss B. Snape, and the staff and pupils of Queen Margaret's School, Escrick, especially the school nursing sister, Mrs R. G. Carter, for their kind co-operation during the epidemic; to Mr R. T. Parry for his help with the statistical analysis; and to Miss June Rogers for her help in preparing and typing the manuscript.

### Deputising services

A frightened patient would rather see a familiar face at night, however well qualified the stranger may be; but when he can have both a friend and a good doctor, half his fears vanish at once. I am not against deputising but I am in favour of the deputy being "one of the family", either a partner or a neighbour about whom our patients know something already.

Our Patron, when President, was addressing a symposium on the community hospital. Instead of discussing hospitals, His Royal Highness chose to consider what makes a community. His witty address, full of humanity and insight, concluded that in a living community everyone knew a good deal about nearly everyone else. So I come back to my thesis that our patients will be happier if our deputies are drawn, not merely from the locality in which they work, but rather from the community in which they live.

### Reference

Watson, G. I. (1978). Address to the South-West Thames Faculty Annual Dinner.