SCHOOL ABSENTEEISM DURING AN OUTBREAK OF B/HONG KONG/5/72-LIKE INFLUENZA VIRUS IN TAIPEI, TAIWAN

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INTRODUCTION

Several means of detecting outbreaks of influenza have been described using hospital morbidity statistics (Goldstein and Block, 1976; Imperato, 1973; USDHEW, 1972) absenteeism in industrial, public services and school populations (Imperato, 1973), mortality statistics (Assad *et al.*, 1973; Housworth and Langmuir, 1974; Ivan and Duda, 1977; Serfling, 1963), virus isolations and serologic studies (Grist *et al.*, 1961; USDHEW 1975). Large urban health agencies have monitored each of these indicators of influenza activity (Imperato, 1973) and have improved the objectivity and rapidity for deciding whether outbreaks are occurring.

In 1975 the U. S. Naval Medical Research Unit No. 2, (NAMRU-2) monitored an outbreak of influenza A among the population of Taipei, Taiwan (Olson, 1976). The outbreak was detected by performing virus isolation attempts using standard procedures (USDHEW, 1975) on clinical material collected from outpatients exhibiting influenza syndrome. There was a clear association between increased absenteeism among school-age children and the frequency of recovery of A influenza strains from patients (Olson, 1976).

In December of 1975 through February 1976 an outbreak of influenza B occurred in Taipei, Taiwan. It was the first reported activity of influenza B in Taiwan since an outbreak was described in 1962 (Green *et al.*, 1964). Morbidity occurred largely in school-age children and we attempted to determine whether it was associated with increased school absenteeism.

MATERIALS AND METHODS

Febrile outpatients with upper respiratory illnesses were sampled one day each week from the pediatric departments of the Veterans General Hospital and the National Taiwan University Hospital, and from the adult walk-in clinic of the Government Employees Central Clinic, all located in Taipei. Only subjects whose onsets were less than five days previous to their visits were studied. Throat swabs were collected, placed in brain-heart infusion (BHI) broth containing antibiotics and transported to the laboratory immediately after collection. Virus isolations were attempted in 10-11 day-old embryonated chicken eggs following standard procedures (USDHEW, 1975). Identification of hemagglutinating agents was accomplished by the hemagglutination inhibition (HI) test using microtiter method (USDHEW, 1975). Prototype strains and antisera were obtained from the World Health Organization (WHO) Collaborating Center for Reference and

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Research on Influenza, Atlanta, Georgia. Selected strains were sent to the WHO Reference Center for identifications.

Weekly records of absences between January 1975 and May 1976 were collected from grades 1-6 and 9-12 of Taipei American School with an enrollment of approximately 650 and 775 students and from grades 1-6 of the Girls Teachers' Colleges Primary School with an approximate enrollment of 2,831 students. Weekly absenteeism rates:

$$\frac{\text{Number of absences per week}}{\text{Number of school days in the week} \times \text{total enrollment}}$$

were calculated for each.

Absenteeism not caused by influenza was estimated by computing the mean absenteeism during all weeks for which no virus isolations were made. No data were available from previous years. A 95% confidence band was plotted by adding two standard deviations to each mean. Absenteeism rates which exceeded this confidence band were considered above normal.

RESULTS

Virus isolation - A total of 52 strains of influenza viruses was isolated from clinical specimens collected between December 1975 and May 1976. Table 1 shows the distribution of isolations of B/Hong Kong/5/72-like and A/Victoria/3/75 (H_3N_2)-like strains by month. Influenza B activity occurred during December 1975, peaked in February 1976 and then declined in March. In addition, 15 strains of influenza A were isolated with increasing frequency beginning in March and peaking in April.

The distribution of influenza isolations and incidence rates by age are shown in Table 2. Children less than 10 years of age had rates of influenza B more than 3 times greater than any other age group. Incidence of influenza (A and B) declined with increased age.

School absenteeism - Data presented in Fig. 1 show that at the beginning of the 51st week of the year, ending December 28, 1975, increased numbers of absences were reported among children attending the Girls Teachers' College Primary School. Greater than normal absenteeism continued through the 3rd week of the new year, ending on January 24, 1976. No report was made during the holiday period between January 25 and March 1.

Absences among the elementary school pupils of Taipei American School (Fig. 2) first exceeded the epidemic threshold begin-

Table 1

Influenza viruses isolated by month of onset, 1975-1976.

Month of onset	No. specimens tested	Influenza strains isolated (%)		
			No. B strains	No. A strains
December	11	5(45)	5	0
January	31	18(58)	17	1
February	5	3(80)	3	0
March	78	19(25)	10	9
April	24	4(15)	0	4
May	56	3(5)	2	1
Total	205	52(25)	37	15

Table 2

Influenza viruses isolates by age of patient, Taipei, 1975-1976.

Age	1972 Taipei population in thousands	Specimens tested	Influenza viruses isolated (%)	Strains isolated (incidence *rate per* 100,000 *population*)	
				B influenza	A influenza
All ages	1,874	205	52 (25)	37 (1.97)	15 (0.80)
Less than 10	436	145	30 (21)	23 (5.28)	7 (1.61)
10 - 19	421	28	11 (39)	7 (1.66)	4 (0.95)
20 - 29	310	8	5 (63)	3 (0.97)	2 (0.65)
30 - 39	238	5	2 (40)	2 (0.84)	0. (0)
40 - 49	235	4	0 (0)	0 (0)	0 (0)
50 and over	234	3	1 (33)	1 (0.43)	0 (0)
Age not recorded	—	12	3 (25)	1	2

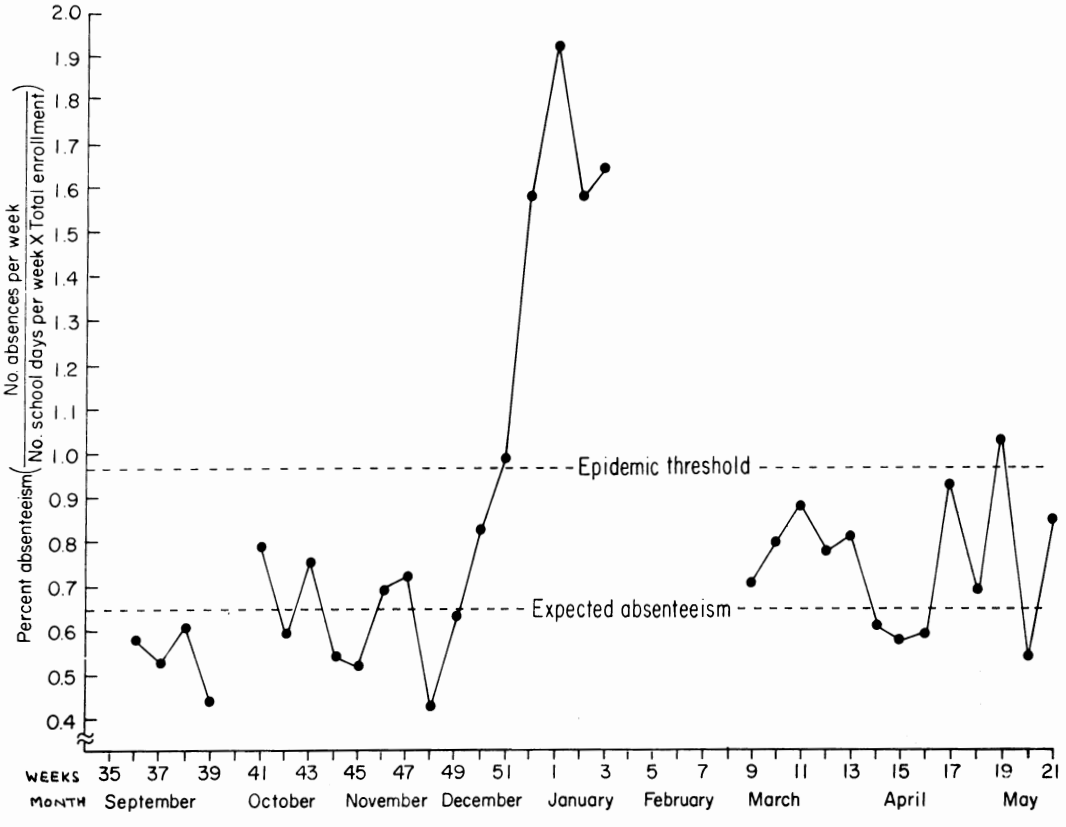

Fig. 1—Absenteeism among grades 1-6, Girls Teachers' College Primary School, Taipei, 1975-1976.

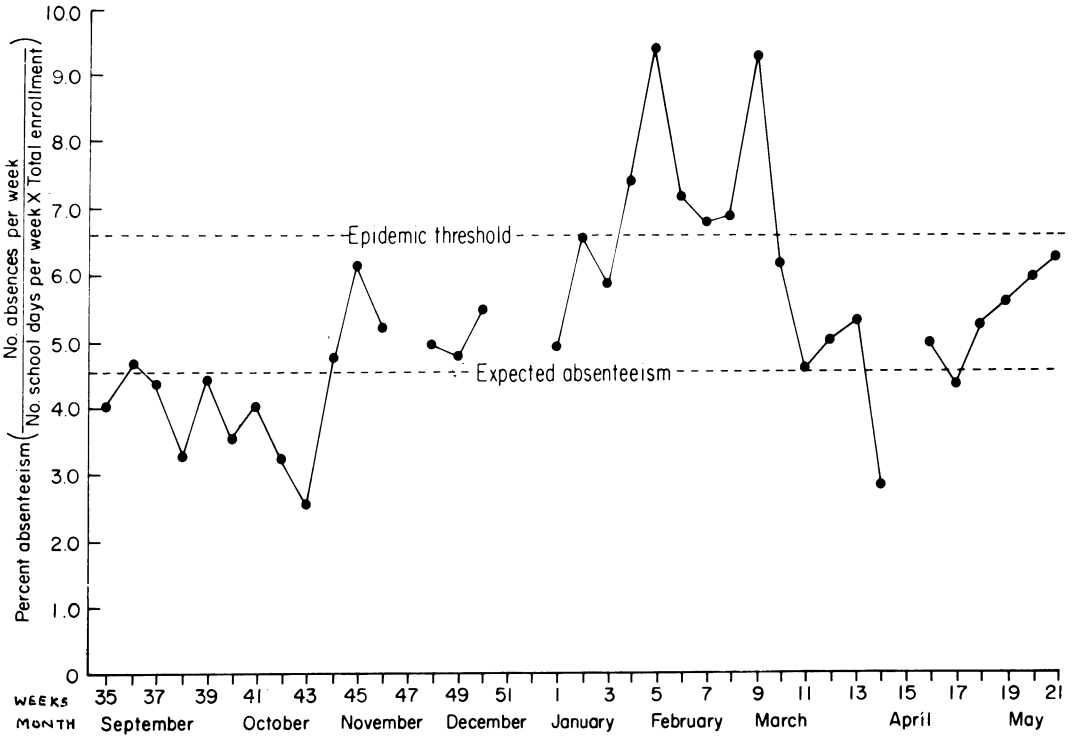

Fig. 2—Absenteeism among grades 1-6, Taipei American School, Taipei, 1975-1976.

ning with the 2nd week which ended January 11, 1976. Absences dropped into the normal range the following week which ended March 5, 1976. No excess absenteeism was recorded in Taipei American High School during the same period.

DISCUSSION

The close temporal correlation between excess absences among primary school children and the isolation of strains of influenza virus (primarily influenza B) demonstrates the value of monitoring absenteeism for surveillance of influenza viruses. Previous studies in Taipei, Taiwan associated high absenteeism rates with increased influenza morbidity during the 1969-1970 outbreak of A/Hong Kong/3/68 (H_3N_2) (Hsia *et al.*, 1971) and during 1975 when A/Victoria/3/75 was active (Olson, 1976).

Absenteeism data suggest that the outbreak began in late December and was over by early March.Clinical influenza cases confirmed by isolation of virus showed a similar distribution in time.

Because of the lack of absenteeism data from previous years, 5-year averages could not be calculated for estimation of normal absenteeism during the months of the year. However, since influenza outbreaks occur throughout the year in Taiwan (Beam *et al.*, 1959; Grayston *et al.*, 1959; Green *et al.*, 1962, 1964; Wiebenga *et al.*, 1970; Hsia *et al.*, 1971; Olson, 1976) without the clear seasonality observed in temperate regions, the absenteeism during these months would not be expected to exceed that observed during the rest of the year. Unpublished data from January through March of 1975 and from June 1976 through March of 1977 show

no seasonal increases in absenteeism. Thus monitoring absenteeism among school children provides a sensitive, inexpensive, simple and available technique for surveillance of influenza activity.

SUMMARY

During 1975 and early 1976 a virologically confirmed outbreak of influenza B virus occurred in Taipei, Taiwan. Absenteeism among school-age children had previously been shown to be a sensitive indicator of influenza A activity. The period during which excess numbers of absences were observed in young school children was temporally associated with the period of maximum recovery of influenza B virus from patients.Monitoring school absenteeism provided a sensitive, inexpensive and simple means for detecting B influenza virus activity.

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