Influenza Surveillance During Winter 1997–1998 in Israel

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Abstract

Background: Each winter influenza activity is a major cause of morbidity and mortality both in Israel and worldwide.

Objectives: To identify the influenza viruses active in Israel during the winter season and to assess the extent of influenza morbidity.

Methods: Information was collected on a population of 18,684 individuals enrolled in two community clinics in central Israel. It included the total number of visits for acute respiratory infection – including influenza and influenza-like illness (ARI/flu-like) – during a 20 week surveillance period (23 November 1997 to 27 March 1998) and the percent of influenza virus isolates in nasopharyngeal specimens from a sample of patients with ARI/flu-like collected on a weekly basis during the same period.

Results: A total of 5,947 visits for ARI/flu-like were recorded among 18,684 enrolled patients in two community clinics (18.1%). The progressive increase in the number of visits for ARI/flu-like reached a peak on week 2/98 with 597 visits and a rate of 31.95 visits per 1,000 population. After this, a decrease to the initial values was evident by week 12/98. Most affected patients were in the age groups 5–14 and 65 years and over, with a rate of 733.5 and 605.3 visits per 1,000 population, respectively. Influenza virus was isolated from 92 of the 426 nasopharyngeal specimens (21.6%). The most commonly detected strain was A/Sydney/5/97(H_3N_2) like (77.2%). The peak rate of isolates was recorded at the beginning of January (01/98).

Conclusions: A/Sydney/5/97(H_3N_2) like-strain was the dominant influenza virus. Its presence did not prevent the simultaneous activity of influenza A/H_1N_1 virus. The dynamic of the clinical disease as expressed by the weekly visit rate for ARI/flu-like was similar to the temporal pattern of the virological findings. The extent of morbidity suggests moderate epidemic activity.

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For Editorial see page 958

The worldwide importance of influenza as a cause of increased morbidity and excess mortality due to complications of the disease during the winter season is well known [1–3]. The unique characteristics of the virus, including high rates of mutation or recombinations that lead to continuous antigenic changes, as well as the short incubation period of the disease contribute to the susceptibility of all age groups and the rapid spread of the virus [4].

The morbidity due to influenza illness has been evaluated by a variety of methods, the most used being: a) the isolation and characterization of the virus detected in nasopharyngeal specimens obtained from individuals with acute respiratory infection including influenza or influenza-like illness (ARI/flu-like), b) the collection of clinical data concerning the total number of physician encounters for new cases of ARI/flu-like, c) admissions to hospital for pneumonia, and d) total number of weekly deaths by age from all causes or due to influenza and pneumonia [5].

In the past, influenza surveillance in Israel comprised two main sources of information: a) virological data provided by the Central Virology Laboratory, Sheba Medical Center, Tel Hashomer, based on the identification of influenza virus in nasopharyngeal specimens collected from community sentinel stations, military clinics and from patients admitted to the hospital [6]; and b) additional information, collected by the Department of Epidemiology of the Ministry of Health, on deaths that had occurred in the winter season due to all causes as well as to pneumonia as a single cause or in combination with other causes [7].

In the winter of 1996–1997 the Israel Center for Disease Control, together with the National Center for Influenza in the Central Virology Laboratory and a group of pediatricians and family physicians in primary care services from the central part of the country, established sentinel reporting of ARI/flu-like [8]. In the winter of 1997–1998 clinical information was added for the first time, and analyzed along with the simultaneously collected virological data. The results are presented in this article.

ARI = acute respiratory infection

Methods

Clinical information was collected on a population of 18,684 individuals enrolled in two primary care clinics in the central area of Israel, representative in terms of age and gender of the 441,800 individuals belonging to two health sub-districts where the survey was conducted.

The information included all visits for acute conditions, diagnosed as ARI including influenza and influenza-like illness (ARI/flu-like), as specified by the ICD-9 edition, which had been recorded in the outpatient clinics during a 20 week surveillance period between 23 November 1997 and 27 March 1998. The clinical diagnoses were grouped into five categories based on the most frequent definitions used by the physicians: a) upper respiratory tract infection, b) pneumonia, c) fever with any symptom of respiratory infection, d) influenza, and e) acute bronchitis/bronchiolitis.

All the general practitioners and pediatricians who co-operated in this study maintained fully computerized records and the clinical data were extracted from their computer database. Our information was extracted anonymously.

The presence of influenza virus was ascertained by collection of nasopharyngeal specimens from 426 patients (2.3% of 18,684) who had visited the clinics within the first 2 days of onset of the symptoms. The specimens were taken from patients who had complained of fever and one or more of the following symptoms: cough, sore throat, runny nose, and muscle ache. The swabs were kept in the clinic at a temperature of 4°C before being transported during the same week to the National Influenza Laboratory for isolation [9] and identification of influenza viruses using the hemagglutination inhibition test [10].

Results

Clinical data

During the 20 week period – 23 November 1997 to 27 March 1998 – a total of 5,974 visits (18.1%) for ARI/flu-like illness was recorded among the 18,684 patients enrolled in the community clinics that participated in the surveillance. A progressive increase in the frequency of visits for ARI/flu-like was observed during the first 8 weeks of the surveillance (week 47/97 until week 2/98), reaching a peak during week 2/98 when 597 visits were recorded, three times more than at the beginning of the survey and representing 26.1% of the total visits in that week. Thereafter, the trend declined to values similar to those observed at the start of the survey [Figure 1].

Most affected were the age groups 5–14 and ⩾ 65 years, as reflected by the age specific rate of 733.5 and 605.3 visits per 1,000 population, respectively, for the whole period of observation. The same pattern was repeated in the weekly age-specific rate, as indicated at the peak of week 2/98 by the rates of 69.4 and 66.9 visits per 1,000 population, in the age groups 5–14 and 65 or over, respectively [Figure 2]. In contrast, the remaining age categories had a much lower rate, while the weekly trend was very similar to that of the highly affected age groups.

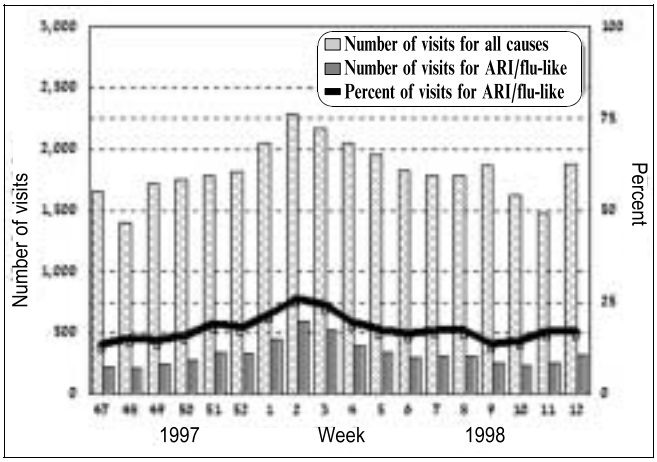

Figure 1. Weekly visits to the outpatient clinics for all causes and for acute respiratory infection including influenza or influenza-like illness.

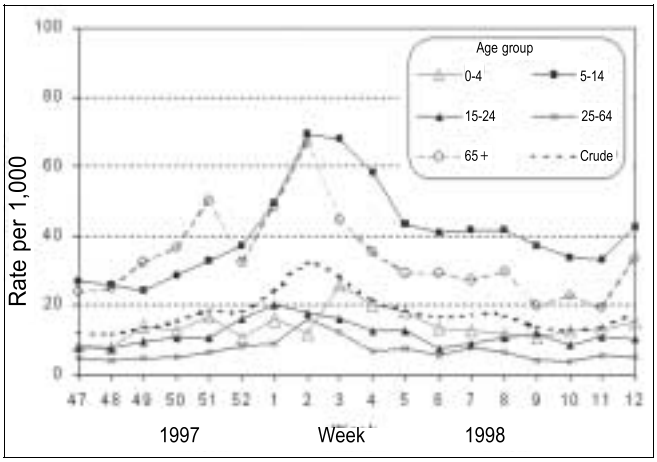

Figure 2. Weekly visits for acute respiratory infection including influenza or influenza-like illness. Crude and age-specific incidence.

The diagnosis of "upper respiratory tract infection" was found to be common in all age groups, but particularly for the ages 5–14 and 65 or over with rates of 613.9 and 457.5 per 1,000 population, respectively. Pneumonia was diagnosed at a rate of 110.5 per 1,000 population in the oldest age group (⩾ 65). However, non-negligible rates were also observed in the age groups 0–4 and 5–14 (37.8 and 31.9 visits per 1,000 population, respectively).

A symptomatic diagnosis of "fever and cough" was observed at rates of 30.0 to 41.8 per 1,000 population in children and the elderly. The specific clinical diagnosis of "influenza" was made at a rate of 51.0 visits per 1,000 population in the 5–14 age group [Table 1].

Virological data

Influenza virus was isolated from 92 of the 426 nasopharyngeal specimens collected from patients who met the inclusion criteria (21.6%).

Table 1. Visits for acute respiratory infection by clinical diagnosis and age group

	Total visits			Age group (rate per 1,000)				
Diagnosis	**No.**	**%**	**Rate per 1,000**	**0–4**	**5–14**	**15–24**	**25–64**	**⩾ 65**
Upper respiratory tract infection	4,722	81.5	252.7	157.4	613.9	190.7	107.4	457.5
Pneumonia	512	8.8	27.4	37.8	31.9	1.9	9.1	110.5
Cough and fever	305	5.3	16.3	41.8	35.8	6.5	4.5	30.0
Influenza	249	4.3	13.3	13.9	51.0	10.7	3.1	5.7
Acute bronchitis	7	0.1	0.4	0.0	1.0	0.0	0.0	1.6
Total	5,795	100.0	310.2	250.9	733.5	209.9	124.1	605.3

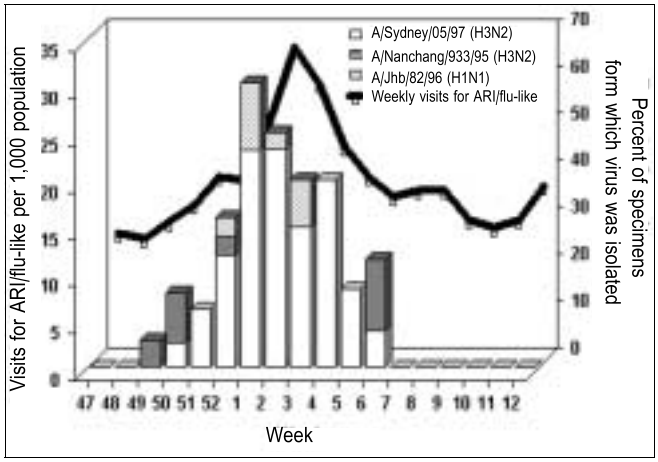

Figure 3. Weekly distribution of visits for acute respiratory infection including influenza or influenza-like illness and influenza virus isolates

The first isolation during the season was an A/Sydney/5/97(H_3N_2) like-strain during week 49/97, which was also the first detection of this sub-type in Israel. Influenza virus detection continued during 10 consecutive weeks, up to week 6/98 [Figure 3]. Three influenza strains circulated during the surveillance period: A/Sydney/5/97(H_3N_2)-like was the most prevalent strain (77.2%), A/Johannesburg/82/96(H_1N_1) accounted for 14.1% of the total isolates, and 8 isolates of A/Nanchang/933/95(H_3N_2)-like strain were detected at the beginning and at the end of the 10 week period of the influenza virus activity. The highest number of isolates was found in the first week of January (1/98). Activity remained high throughout the month of January, after which a decline in the number of isolates was evident. From the end of February onward, no influenza virus was detected in the nasopharyngeal specimens, although collection of swabs for virological analysis had continued until the end of the surveillance period on week 12/98.

The distribution of influenza virus isolates and the rate of consultations for ARI/flu-like showed a similar weekly trend. The peak of the virus isolates preceded the peak of visits by one week.

Discussion

The system of double monitoring based on the use of virological and clinical data has been frequently used in influenza surveillance [1,3,5]. It has several advantages: a) early identification of the active agent might facilitate the use of chemotherapy [5] and lead to reconsidering the use of vaccine, b) virological information helps in establishing the clinical diagnosis, and c) relevant data can be provided to the public.

The clinical data referred to the number of visits and not to the number of diagnosed patients. This approach is still in use because of its convenience [5,11]. Its principal limitation is the absence of information needed to evaluate the incidence of the event. In this respect one should remember that up to 15% of patients with ARI/flu-like, who do not consult the physician about their condition [12], also contribute to the distortion of information indicative of the true morbidity. However, its usefulness as an indicator of influenza activity is supported by the almost identical dynamic of virus activity and the rate of visits for ARI/flu-like as well as by the congruence of the local observations during the 1997–98 epidemic with those from other countries [13].

The trend of influenza activity in Israel was similar to that reported in the USA [13] and Britain [14], but was different from that observed elsewhere [15]. Such differences between countries are common, for instance, the time of onset of the epidemic and the length of interval until the first and consecutive peaks. This depends, among other factors, upon the previous occurrence of the prevalent strain and its antigenic characteristics, the degree of immunity of the local population at the beginning of the epidemic, and the frequency of contact between the monitored area and the world foci of influenza [2].

Evaluation of the extent of the 1997–98 influenza activity and the increased workload for the general practitioner was not possible due to the lack of baseline clinical data on the activity of influenza and its epidemic threshold in Israel. In other countries that had experienced influenza epidemics in 1997–98, its activity was evaluated as moderate [14,16,17].

The age pattern observed in Israel was somewhat different from that usually reported in other countries. The high morbidity seen in the age group ⩾ 65 in Israel contrasted to the much lower involvement of the same age group in the 1997–98 epidemic in countries like the USA, Britain and the Netherlands [13,14,16]. Local findings support the role of school children as reservoir and in propagation of the virus, and the high vulnerability of the elderly.

The dominance of A/Sydney/5/97(H_3N_2) like-strain in the 1997–98 outbreak concurred with observations of many

European countries [15,18] as well as the U.S. [17]. Unlike Israel, where influenza B virus was not isolated, many other countries reported its activity [13].

The parallel between the community distribution of the virus and the ARI/flu-like morbidity curve highlights the contribution of the influenza virus to the seasonal morbidity in the community and serves as a validation tool of influenza activity [1,16].

The control of influenza, one of the most important current causes of global epidemics, is an important challenge to the health services. Monitoring of influenza is the first step towards better control, based on vaccine coverage and the judicious use of the presently available drugs.

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