Influenza and other acute respiratory diseases in the Czech Socialist Republic, 1969–1974*

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Since 1969, the incidence of acute respiratory diseases (ARD) in the Czech Socialist Republic of Czechoslovakia has been monitored by a special programme based on reports from 85 district epidemiological centres. In this paper, the incidence of ARD in three age groups, together with the incidence of complications and death rates, are presented for each season during the period 1969–1974. The significance of epidemiological observations and laboratory investigations relating to influenza and other ARD agents, such as parainfluenza viruses, adenoviruses, rhinoviruses, RS virus, coronaviruses, and Mycoplasma pneumoniae, *is discussed.*

In the past, the incidence of acute respiratory diseases (ARD) in Czechoslovakia has mainly been studied during influenza epidemics. A new method of monitoring was introduced in January 1969, in order to obtain more information on the epidemiology of ARD, particularly influenza. The possibilities of assessing seasonal incidence, the character of the epidemics, their type of periodicity, and any other important phenomena in relation to age groups were the main considerations. Coupled with systematic laboratory investigations (virological examinations of acute diseases and immunological surveys of the population), the new system of monitoring forms an important part of the surveillance programme for ARD in the Czech Socialist Republic (ČSR, the western two-thirds of Czechoslovakia). The results of this programme obtained during 1969–1974 are reported in this paper.

MATERIALS AND METHODS

Epidemiology

The incidence of primary disease, of complications (e.g., bronchitis, pneumonia, sinusitis, otitis), and of deaths due to both causes were studied in all 85 districts of the ČSR.

Data were forwarded on special forms to the Institute of Hygiene and Epidemiology, where they were processed by means of an LGP 20 computer, the output being tables and cartograms (*3*). Data from the tables were used for graph construction.

Virology

For virus isolation, nasopharyngeal washings from adults and cotton wool swabs from children were collected and placed in a medium prepared with calf infusion, 0.5% bovine albumin, and antibiotics.

Influenza virus isolations were performed in chick embryos; isolations of other agents, i.e., parainfluenza viruses, adenoviruses, respiratory syncytial (RS) virus, rhinoviruses, coronaviruses, and *Mycoplasma pneumoniae*, were performed with suitable culture media (*6*).

Identification of isolated agents was carried out with known animal reference sera and/or standard sera provided by the World Health Organization.

Sera for examination were collected at the acute stage of the disease and 14–21 days after the onset of the disease and stored at −20°C until they were tested.

Specimens were collected mainly in selected communities in Prague but samples from regional and district laboratories in the ČSR were also used.

Serological tests

The haemagglutination-inhibition test was used to detect antibodies to influenza and parainfluenza viruses; nonspecific inhibitors were removed with

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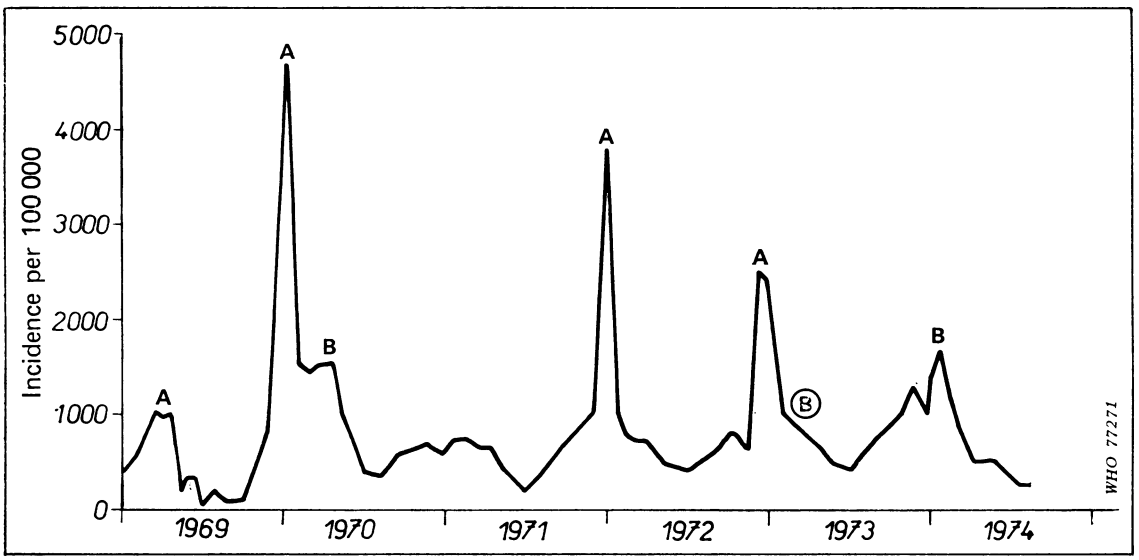

Fig. 1. Incidence of acute respiratory diseases in the ČSR, 1969–1974. A and B indicate the type of influenza virus identified as the etiological agent of each epidemic. Ⓑ indicates that the virus was demonstrated in sporadic cases only.

receptor-destroying enzyme. The immunodiffusion test was used to detect ribonucleoprotein (RNP) antibodies specific for type A and B influenza viruses. The complement-fixation (CF) test as described by Pereira et al. (*8*) was used to detect antibodies to influenza and parainfluenza viruses; the normal microtitration method was used to detect antibodies to other agents.

The following antigens were used in the tests:

1. Influenza: allantoic fluid containing recent influenza virus strains of type A and B; type-specific RNP antigens from chorioallantoic membranes.
2. Parainfluenza: types 1, 2, and 3 in the form of Tween antigen (*6*).
3. RS virus: CF antigen prepared from the prototype Long strain in tissue culture.
4. Adenoviruses: CF group-specific antigen prepared in tissue culture from prototype adenovirus strains, types 1–7 and 14.
5. *Mycoplasma pneumoniae:* CF antigen in the form of concentrated lipoid extract prepared from the prototype strain FH.

RESULTS

The incidence of ARD for the whole period 1969–1974 is shown in Fig. 1, from which it can be seen that epidemics occurred in four seasons and were particularly violent in three (1969–1970, 1971–1972, and 1972–1973).

Some interesting features are revealed when the incidence rates for different age groups are compared (Fig. 2), especially the fact that the curves for the different age groups and those for the total population do not, in all waves, show a similar character. For this reason the individual seasons have been analysed separately in relation to age group.

Season 1968–1969

Uniform ARD monitoring was begun on 1 January 1969, so that the first part of the 1968–1969 season could not be evaluated. During January–April 1969, an increased incidence of ARD was noted which, nevertheless, did not reach epidemic size in any of the age groups. It was during this period that the new antigenic variant of type A influenza virus, A/Hong Kong/1/68 (H3N2), began to circulate. This particular seasonal rise in incidence fell within the time scale of the influenza pandemic that swept through most countries during the second half of 1968 and the first half of 1969.

Season 1969–1970

A substantially different situation was caused by A/Hong Kong/1/68 in the following season, when an

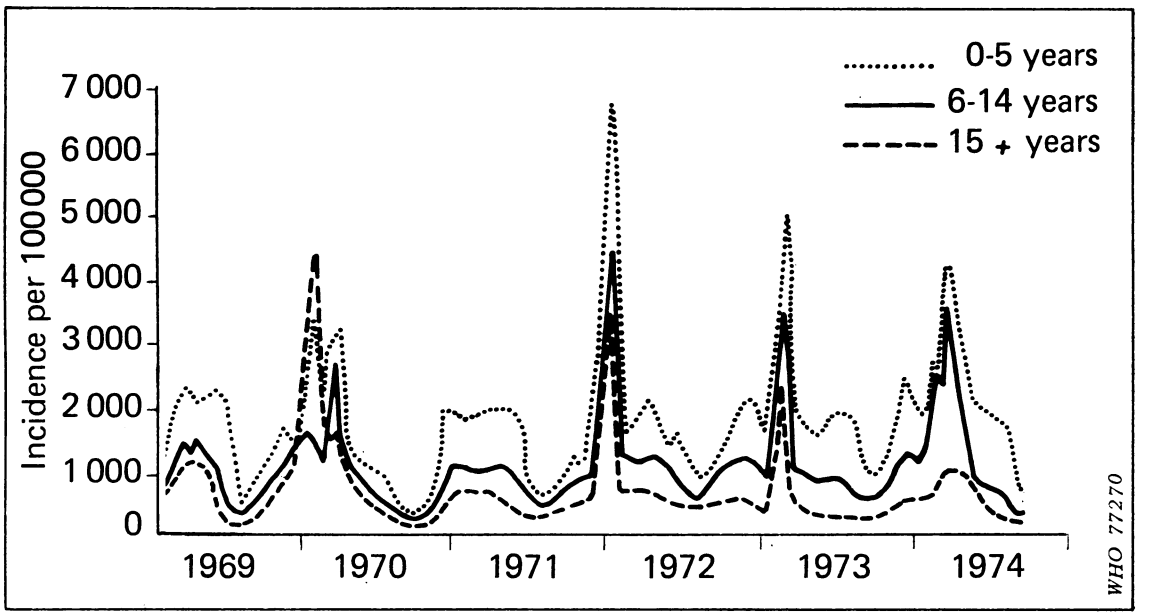

Fig. 2. Age-related incidence of acute respiratory diseases in the ČSR, 1969–1974.

epidemic developed suddenly at the end of December 1969 and the beginning of January 1970. Incidence was high in the adult population and in the children 0–5 years of age, whereas those 6–14 years of age were relatively unaffected. This outbreak was immediately followed by a second wave, caused by influenza B virus, which mainly affected the two youngest age groups.

Season 1970–1971

This season was free from ARD epidemics. Nevertheless, systematic serological examinations revealed limited circulation of influenza A and B viruses.

Season 1971–1972

During the large influenza A epidemic from the second half of November 1971 to the beginning of January 1972, the dominant feature was a high incidence in both of the lower age groups; adults showed a substantially lower incidence. The etiological factor continued to be strains of A/Hong Kong/1/68. The second wave of that season, in February 1972, was caused by type B influenza virus.

Season 1972–1973

The situation was very similar to that of the preceding season, the incidence again being markedly higher in the two youngest age groups. The influenza strain responsible for the epidemic was identified as A/England/42/72.

In view of the very high incidence in the 0–5-year age group, patients from three kindergartens in Prague were examined virologically and serologically. Despite the fact that the influenza epidemic was then at its height, parainfluenza viruses, RS virus, and rhinoviruses were demonstrated to be etiological agents of ARD as well as type A influenza strains.

Season 1973–1974

The epidemic occurred suddenly, but only in the two youngest groups. The incidence among adults did not exceed the usual seasonal rate even at the height of the epidemic. The apparent two-peak nature of the epidemic is an artifact of registration owing to the intervention of Christmas. The epidemic was caused by type B influenza virus and was preceded by higher morbidity in September–October 1973 due mainly to adenoviral infections.

The incidence of complications is shown in Fig. 3. In general, the curve follows that for the primary disease. The higher level of complications was mainly due to " pneumonia (bronchopneumonia) " and " bronchitis " and was associated with epidemics

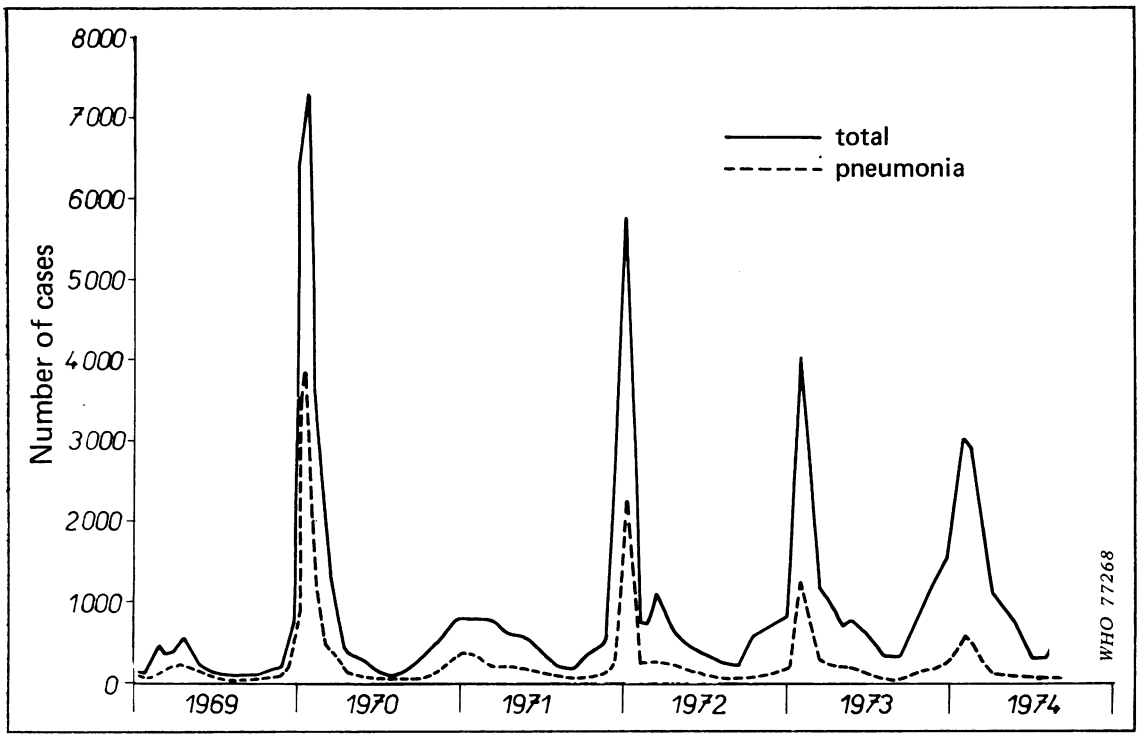

Fig. 3. Number of cases of complications following ARD infection in the ČSR, 1969–1974.

caused by both type A and type B influenza. However, there was no marked increase in " pneumonia " associated with the type B influenza epidemic of 1973–1974 or the second wave of 1969–1970.

Mortality caused by ARD is also recorded by the present monitoring system. Fig. 4, however, is based on data from the register of births and deaths of the ČSR, dating back to 1950. Increases in the death rate were observed only during some of the seasons, the most marked being during the first wave of the 1969–1970 epidemic; lower rates were recorded in the 1971–1972 and 1972–1973 seasons. All were associated with influenza epidemics caused by type A strains. The low excess mortality in the second half of the 1968–1969 season is consistent with the low incidence of disease during this period. Mortality was also very low in the 1973–1974 season characterized by the type B influenza epidemic.

There was a marked agreement between the results of epidemiological and laboratory investigations during the influenza epidemic periods. For the other disease agents, however, agreement between the ARD morbidity curves and the virological results was less evident. This is an indication of the different epidemiological behaviour and importance of the various agents. For instance, adenovirus circulation was demonstrated throughout the year, almost without relation to the notified incidence curve. Also, the distribution of parainfluenza isolates over the year was somewhat greater than that of influenza isolates. The circulation of RS virus and rhinoviruses appeared to be more closely related to influenza epidemic curves, but this may have been quite accidental.

DISCUSSION AND CONCLUSIONS

Reliable ascertainment of the incidence of ARD, including influenza, is a very complicated matter. For this reason, in many countries use is made of a variety of indices that indirectly reflect the actual epidemiological situation. Such methods may include the collection of information on the number of hospital patients with a certain diagnosis, such as pneumonia, bronchitis, or ARD, as in Yugoslavia (*1*) or the United Kingdom (*9*). Other indirect

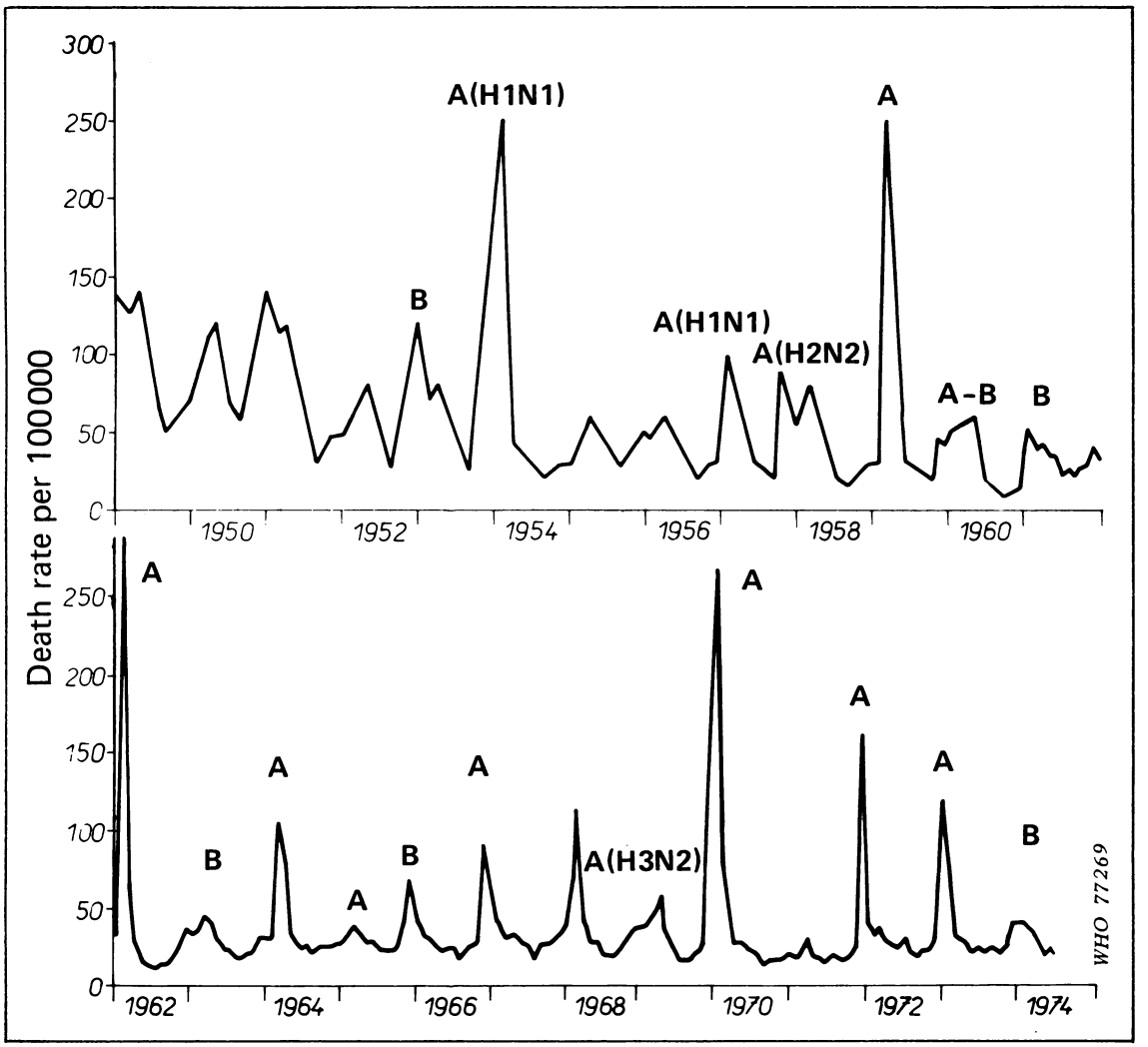

Fig. 4. Death rates from influenza and pneumonia in the ČSR, 1950–1974.

indices are absence from work, as used in the United Kingdom (*9*), or school absenteeism (*4*). These methods have their disadvantages; above all, they are biased by factors not directly related to the epidemic itself such as the availability of hospital beds and care, the severity of the disease, and the unrepresentative nature of the population surveyed. Moreover, data of this kind from different countries are not usually comparable.

A useful way of assessing the situation, especially during influenza epidemics, is to measure excess mortality. This is considered one of the most objective indicators of " severe " and " mild " influenza epidemics. Although even this method has its weak points, it has been widely used for several decades in many countries in well-planned programmes (*1*, *2*, *5*, *7*, *9*, *10*).

The incidence of ARD as a whole is also recorded to different degrees in different countries, e.g., the German Democratic Republic (Starke & Siebelist, personal communication, 1975), the USSR (*11*), and the United Kingdom (*9*). This type of study is mainly restricted to certain selected areas (e.g., large cities in the USSR) or to a certain group of people

(such as the network of cooperating general practitioners in the United Kingdom).

Within the organizational structure of the Czechoslovak health services it has been possible to set up and examine in practice a programme to monitor ARD incidence systematically over a fairly large area.

The system is, of course, not a perfect one in that it does not provide comprehensive data on such factors as the incidence of complications and the ratio of bacterial to viral diseases in routine clinical practice. Nevertheless, these deficiencies do not reduce the value of the information the monitoring system provides. Incidence trends, time and age factors, and rough percentages of complications and excess mortality may be assessed with satisfactory reliability. Further systematic studies might throw more light on some of the possible relationships suggested so far, or might point to the need for modification of the programme.

RÉSUMÉ

GRIPPE ET AUTRES AFFECTIONS RESPIRATOIRES AIGUËS DANS LA RÉPUBLIQUE SOCIALISTE TCHÈQUE DE 1969 À 1974

Dans la République socialiste tchèque de Tchécoslovaquie, les affections respiratoires aiguës, y compris la grippe, ont fait l'objet, de façon continue depuis l'année 1969, d'un programme de surveillance spéciale. Ce programme est fondé sur les observations de morbidité faites par 85 centres épidémiologiques de district dont les rapports hebdomadaires sont rapidement traités sur ordinateur et évalués statistiquement et épidémiologiquement. Des examens de laboratoire sont effectués à l'Institut d'Hygiène et d'Epidémiologie de Prague et dans 19 laboratoires périphériques. Les résultats obtenus durant la période 1969-1974 comprennent l'incidence des affections respiratoires aiguës dans trois groupes d'âges ainsi que la fréquence des complications et la mortalité. L'importance de ces observations épidémiologiques et des résultats de laboratoires concernant les agents de la grippe et d'autres affections respiratoires aiguës (tels que les virus parainfluenza, adénovirus, rhinovirus respiratoire syncytial, coronavirus et *Mycoplasma pneumoniae*) est examinée.

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