

## The 1957 Influenza Pandemic in the USSR

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**Spread of the pandemic.** The influenza pandemic began in the USSR in the first ten days of May 1957, when an increase in the influenza morbidity rate was noted in the cities of Tashkent, Stalinabad, Ashkabad and other places in Central Asia, as compared with the same period in 1956 and with the preceding 10-day periods of 1957. Somewhat later, during the second and third 10-day periods of May, an increase in the influenza morbidity rate was noted in Omsk, Novosibirsk and other cities of Western Siberia.

The influenza was apparently brought in from neighbouring countries through these localities by travellers using land and air transport.

The influenza pandemic spread through the Soviet Union in two waves. The first occurred during May and June and took the form of limited outbreaks in the cities of Central Asia, the towns along the Trans-Siberian railway and in some of the central regions of the European part of the USSR (Moscow, Leningrad). In July, August and September, there was a decrease in the morbidity rate, although in the cities mentioned it remained higher than in previous years.

Towards the end of September and the beginning of October, the influenza morbidity rate began to increase very quickly throughout the whole of the USSR, reaching its peak in the second half of October. At the beginning of November it began to decrease sharply and in December had fallen back to a level differing only slightly from the usual rate at that time of year in the periods between epidemics. During the first four months of 1958, the morbidity rate was slightly in excess of that usual in those months when there is no epidemic.

**Morbidity and clinical features.** In the USSR, reports on the incidence of influenza for separate weeks and 10-day periods are not made by medical establishments. However, reports for 10-day periods are introduced during epidemics, although only in certain large cities and not in the country as a whole. The accompanying table gives the influenza morbidity rate per 10 000 of the population for the three autumn months of 1957, by 10-day period.

To assess the incidence of the disease among the population, in addition to the monthly morbidity statistics which include those registered as suffering from influenza and acute catarrhal infections of the upper respiratory passages, data were used which were collected by complete surveys of large groups of population in the cities. The results of these surveys were compared with the data for the cases registered by medical establishments. This

**INFLUENZA MORBIDITY PER 10 000 POPULATION IN CITIES OF THE USSR,  
AUTUMN 1957**

City	September			October			November		
	10-day period			10-day period			10-day period		
	1	2	3	1	2	3	1	2	3
Gorki	74	76	82	233	803	686	98	102	91
Saratov	38	64	72	247	918	552	106	no infor- mation	91
Riga	37	49	64	268	601	434	110	119	95
Kiev	43	85	218	658	693	368	94	141	127
Odessa	38	78	131	734	956	524	77	no infor- mation	no infor- mation
Erevan	7	5	6	60	511	731	111	106	86
Sverdlovsk	41	49	61	99	635	869	127	108	82
Omsk	29	34	45	47	270	541	144	95	68
Irkutsk	37	41	45	240	507	427	85	69	34
Tashkent	28	37	40	51	61	213	142	175	98

showed that in various localities the number of cases shown by survey exceeded the number registered by the medical establishments by a range of from 16% in some cities of the Latvian SSR to 50% in some cities in the Kirghiz SSR, the average being about 30%.

Data are given below concerning the incidence of influenza among various groups of the population in places in the central zone of the USSR.

In Leningrad the morbidity rates per 1000 persons of various age-groups during October and November were as follows: up to 2 years of age, 406; from 3-15 years of age, 409; 16 years and over, 231; average for all age-groups, 272.

In Kaunas, the morbidity rate per 1000 people was 351 among the productive workers, 127 among office workers, 149 among schoolchildren, 39 in kindergartens and crèches, 65 among housewives and 30 among other groups. The incidence of the disease among the various age-groups and professions in various localities fluctuated quite widely, depending in particular on the ratio of urban to rural population. On the average, the incidence among the rural population was two to three times less than among the urban population. For example, in the Ukraine during the whole of 1957, 27.6% of the urban population and 9.3% of the rural population suffered from influenza.

There were some peculiar features in the clinical picture of influenza in 1957 during both the summer and the autumn pandemic periods. The most characteristic feature of the summer outbreaks was that in many cases catarrhal symptoms in the upper respiratory passages were almost absent, the most prominent symptoms being those of general toxicosis

with, quite often, vomiting and diarrhoea as the reaction shown by the gastro-intestinal tract. In 5%-6% of cases, especially among young patients, there was noted an enlargement of the lymph nodes, the liver and the spleen.

In the autumn, catarrhal symptoms were more often met with and the general course of the illness was more serious, with more frequent complications such as pneumonia and otitis. The disease, especially in children, quite often occurred in two waves, accompanied by a two-phase temperature curve; the first rise in temperature was connected with the multiplication of the virus in the upper respiratory passages and the second with the movement of the virus into the lungs.

The highest mortality rate from influenza and pneumonia occurred during the period of rapid increase in the rate of morbidity (October-November). During this period, in the 310 largest towns for which monthly statistics are available, mortality from influenza and various forms of pneumonia was 12 per 100 000. In the country as a whole, it must have been considerably lower than this, if the difference in the incidence of the disease among the urban and rural populations is allowed for. Tentative estimates give a rough figure of 7-8 per 100 000.

The highest fatality rate was among children up to two years of age. In Leningrad, for instance, the fatality rate among children of two years and under was 12 times as high as among persons of 16 years and over. As a whole, the 1957 pandemic did not lead to increased mortality from pneumonia. Indeed, the number who died from that disease in 1957 was 10.2% less than in 1956.

Among both adults and children, the cause of death was pneumonia in 95% of the fatal influenza cases. In contrast to previous years, when the main cause of death was the development of a secondary (staphylococcal, streptococcal or pneumococcal) bacterial infection, in 1957 the types of infection most frequently met with were primary influenzal (haemorrhagic) pneumonias. The presence of the virus was confirmed by its isolation from the lungs of those who died from influenza in cases where bacterial microflora were entirely, or almost entirely, absent. Among the bacterial causative agents, those most frequently met with were the *Staphylococcus aureus* group. No special data are available on their resistance to antibiotics.

Post mortem examinations of those who died of influenza showed typical signs of influenzal pneumonia: lobular, lobar and haemorrhagic pneumonia, and in children, often, interstitial pneumonia. In addition, other signs of influenzal toxicosis were noted: acute cerebral oedema and haemorrhagic foci in the internal organs.

**Laboratory and associated findings.** The laboratory diagnosis of influenza was carried out in the network of virological laboratories attached to the epidemiological centres in the large cities and in the laboratories of large hospitals. According to incomplete data, during the pandemic more than 1000 strains of influenza virus were distinguished, most of them belonging to the type A/Asia/57 (A2). Further study of these viruses made it possible to divide them by means of the haemagglutination-inhibition reaction into two groups: avid strains with a slight antigenic relationship to viruses A

and A1, sensitive to normal inhibitors; and non-avid strains with no antigenic relationship to viruses A and A1 and insensitive to inhibitors. The serological examination of fresh sera from influenza cases carried out in many cities of the USSR showed an increase of antibodies to virus A2 in 70%-90% of the cases investigated at the height of the epidemic. In addition, an increase was observed in some cases in the number of antibodies to viruses A and A1, and in a few cases in antibodies to other viruses.

The serological examination of sera from the population in order to determine its level of immunity to influenza was carried out by simultaneous examination of sera from donors in various cities of the USSR in April-May and August-September of 1957 and January-March of 1958. This showed an absence of virus-neutralizing antibodies among the population in April and May, the presence of virus-neutralizing antibodies in a considerable proportion of the people in August and September in cities which had suffered from outbreaks of influenza in the summer, and a high level of virus-neutralizing antibodies everywhere at the beginning of 1958.

According to data from sample inquiries, cases of subclinical forms of influenza were not often observed during the 1957 influenza pandemic, amounting to not more than 6%-10%. In some communities everybody suffered from influenza and no subclinical forms were observed at all.

The 1957 pandemic was not accompanied by any noticeable increase in respiratory diseases among animals serious enough to attract the attention of veterinary workers. An exception occurred in the city of Kharkov, where cases of influenza among workers at the local race-course were accompanied by influenza-like diseases among the horses. The nature of these diseases is still under study.<sup>a</sup>

**Immunology, treatment and prevention.** As stated above, the 1957 influenza pandemic spread in two waves. The first, in the summer, attacking certain cities only, while the second, autumn, wave spread throughout the country. It was noted that in those cities where the first wave was intensive, the second wave was more moderate. For example, in Tashkent in May there were 88 000 cases, and in November 33 000. At the same time, persons and whole communities who had suffered from influenza during the first wave as a rule did not contract it again during the second wave. However, in certain cities, second attacks of influenza in 1957 amounted to 10%-11% of the cases, although the figure might include other influenza-like ailments.

During the 1957 pandemic, a test was made of the effectiveness of various methods and medicaments for influenza therapy suggested by medical research workers. A preliminary assessment leads to the following conclusions.

The most effective means of preventing bacterial complications were the antibiotics: penicillin, chlortetracycline and oxytetracycline. In cases of primary virus pneumonia, these antibiotics had no effect. Good results were

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<sup>a</sup> See page 505.

obtained by the intramuscular injection of hyperimmune horse serum against virus A2. When this serum was introduced into the respiratory passages in powdered form, it also had good therapeutic effects if used early (in the first two days of the illness) and was successful as a prophylactic agent among contacts.

The first strains of virus A2 were isolated in May and June. During the summer months they were studied intensively, one of the main tasks being the obtaining of vaccine strains and the preparation of a monovalent A2 vaccine. In view of the urgency of preparing vaccine, it was decided to prepare before the beginning of the expected autumn pandemic wave the maximum possible quantity of monovalent A2 vaccine, in order to inoculate in the first place workers in the medical services, trade and transport, and then, as new batches of vaccine were produced, industrial workers and office workers. This problem was solved by the Ivanovski Virological Institute of the USSR Academy of Medical Sciences and the Mechnikov Vaccine and Serum Institute in Moscow. During June and July, the Ivanovski Institute evolved and tested vaccinal strains, and in August the Mechnikov Institute began the mass manufacture of the vaccine, which was later also made at the Leningrad and Kharkov Institutes for Scientific Research on Vaccines and Sera. The main vaccinal strain was the Iksha strain (a non-avid variety of virus A2), which was attenuated after 6-8 passages in chick-embryo until, in a dose of 0.05-0.1 ml (reckoned in terms of whole allantoic fluid), it caused moderate general and local reactions among only 3%-5% of those inoculated. Its immunogenic properties were also fully satisfactory. During October, November and December, according to provisional data, more than three million people were inoculated against influenza with this monovalent vaccine and by the end of the year more than 10 million doses of the vaccine had been despatched to various places. Of course, it was only possible to use part of the vaccine in good time before the beginning of epidemic outbreaks in the larger population centres. In a considerable number of cases, inoculation coincided with the beginning of the epidemic.

According to data from a number of towns and cities, the morbidity rate among the inoculated was roughly two to four times lower than among the uninoculated (Moscow 2.5, Krasnodar 3.2, Kharkov 2.3, Leningrad 2.05-2.3, Minsk 3.0). Observations carried out during the influenza pandemic also showed the effectiveness of general anti-epidemic measures for influenza control, particularly the early isolation of patients, the placing of children's establishments in quarantine and the organization of medical treatment of the sick in their homes.

The influenza wave in Moscow and many other cities attacked young children least of all, although they are the most susceptible group. Many of the crèches and kindergartens were little affected by influenza, whereas in others the introduction of influenza led to all the children suffering from it; analysis of these centres of infection showed that the strict application of quarantine measures and early isolation by separating sufferers from the rest of the children prevented the spread of intensive outbreaks, even when influenza was actually introduced many times into the particular kindergarten or crèche. On the other hand, neglect of these measures inevitably led

to all the children falling ill. Similar effects were noted among adult communities, particularly during the Sixth World Youth Festival.

A great part in the prevention of the spread of the influenza epidemic was played by health education work among the people: the publication on a mass scale of placards, posters, pamphlets and leaflets, systematic radio and television propaganda, the printing of a series of articles on influenza in the mass-circulation press, the showing of films on the subject, and similar measures.

## **The Asian Influenza Pandemic in Turkey, 1957-58**

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**Spread of the pandemic.** Spreading from Hong Kong and Singapore by air, sea and land, Asian influenza reached Iran, Iraq and Syria, the south and south-eastern neighbours of Turkey, in July 1957. In view, *inter alia*, of the extensive trade carried on over the Turkish-Syrian border and of the extensive traffic along the main road between Turkey and Iran, it was evident that the pandemic could not fail to involve Turkey. The Ministry of Health and Social Welfare accordingly took the necessary precautions to deal with air and sea passengers arriving in Turkey and with the Mecca pilgrims who would arrive overland. Thus two specialists were sent at the end of July 1957 to study the situation in the cities on the south-eastern border of Turkey and to take throat swabs and throat washings as well as serum samples for examination. These were forwarded by air to the Influenza Centre at the Refik Saydam Central Institute of Hygiene in Ankara. Influenza infections were discovered among the civilian population and among police and military units. It was learned at the same time that influenza was also breaking out in Kars Province along the main Turkish-Iranian road and among civilians and the military elsewhere in eastern Turkey. On 7 August throat swabs from patients diagnosed as suffering from influenza were sent by air from Erzurum to the Influenza Centre, and in the second week of August cases were notified in the provinces to the west of Erzurum.

In Ankara, influenza cases were observed in the first week in August and throat swabs and sera from patients were received from various civil hospitals and from the Air Forces in Ankara.

By the second week of August cases of influenza were reported from almost every part of Turkey; throat swabs and sera were forwarded from NATO Air Force personnel in Adana on 14-19 August, from Inebolu (on the Black Sea coast) on 15 August, and from NATO Air Force personnel in Izmir from 2 August to 18 September.