Epidemic influenza

Patterns over 20 years (1949–1968)

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THE features of influenza as the most extensive of recurrent epidemics are well known. Its regular periodic occurrences affecting large sections of populations are appreciated as are problems of immunity and changing pathogenicity of the various strains of the causal influenza virus.

Not so well known are some epidemiological characters of the epidemics themselves. Features such as the age and sex distribution of those infected, individual susceptibility in successive epidemics and their severity when studied reveal some intriguing facts. Comparison of a series of epidemics enables a clinical profile to be defined, which is of some importance in developing therapeutic and preventive attitudes.

This paper summarizes and reviews eight successive epidemics of proven influenza over 20 years (1949–1968) in a single general practice. Special opportunities exist in general practice for such a study on account of the possibilities of following up and observing a relatively static and known population over many years.

Methods

The population studied was in a general practice sited in the suburbs of London. The size of the practice population averaged approximately 6,000 persons. There was inevitably some movement of individuals in and out of the area, but the annual turnover did not exceed seven per cent.

The study was based on a record system (Fry, J. *Profiles of disease* (1966)), which enabled ready analysis of present and past morbidity within the practice.

The diagnosis of 'epidemic influenza' was made only when there was clear evidence of national or local epidemics during which virological confirmation was available. During each epidemic analyses were made of its extent as determined by the numbers of persons seen by the physicians (patient-consultation rate); of those affected according to age and sex distributions; of severity, as shown by chest and other complications and deaths; and of individual susceptibilities.

The true incidence of influenza during an epidemic cannot be determined by patient-consulting rates, but as it is quite impractical to determine the extent of influenza during an epidemic it is reasonable in such circumstances to use these rates, particularly as this same rate was used in each of the eight epidemics studied.

Results

Incidence. The patient-consultation rates for each epidemic are shown in table I. The mean rate for the eight epidemics was eight per cent, but within this there were some differences. Thus the high rates during the 'Asian' influenza epidemic of 1957 and the following one in 1959, were probably because they were caused by relatively new strains of influenza virus to which there was little host immunity and the low rates of 1955 and 1961 are explained similarly by the fact that there was good host immunity to 'old' and well-known strains of virus.

Age incidence. The susceptibility to infection by the influenza viruses varies with age. In table II, the age incidence in the eight epidemics shows that there is a tendency

for children to be most susceptible, but in some epidemics such as the most recent in 1967–68, the elderly also were frequently infected. The explanations for the varying age incidence must lie in the varying immunity against influenza at the respective age periods.

Children with no previous immunity experiences are clearly liable in any epidemic but adults who have suffered either clinical or subclinical infections with resulting

TABLE I

PATIENT CONSULTATION RATES DURING INFLUENZA EPIDEMICS 1949–1968

Year	*1950–1*	*1953*	*1955*	*1957*	*1959*	*1961*	*1966*	*1967–8*
Strains of influenza virus ..	A	A	B	A	A/B	A	B/A	A
Patients consulting	223	264	150	930	849	203	544	675
Percentage of those at risk ..	*6*	*6*	*3*	*17*	*14*	*3*	*7*	*8*

attainment of some immunity will be more resistant to subsequent infections. The likelihood of infection, then, must depend on host and individual susceptibilities. In the 1967–68 epidemic the strain of A_2 influenza virus must have been one against which the elderly were not immune, hence the much higher incidence rates in those over 60 than in previous epidemics.

The 'Asian influenza' epidemic of 1957 and that of 1959 were the most widespread and affected the young and middle-aged and spared the elderly. The explanation given at the time was that these epidemics (of 1957 and 1959) were caused by strains of virus that probably had been responsible for epidemics in the 1890's to which the over 70-year old had some immunity.

TABLE II

AGE INCIDENCE OF INFLUENZA IN EPIDEMICS (1949–1968) EXPRESSED IN RATES PER 100 AT RISK

Ages (years)	*Type*	*0–*	*10–*	*20–*	*30–*	*40–*	*50–*	*60–*	*70+*	*Whole population*
1950–1	A	2	4	6	8	4	10	5	4	6
1953	A	2	4	10	5	8	8	8	2	6
1955	B	6	3	3	3	3	3	3	2	3
1957	A	27	36	18	13	12	10	9	4	17
1959	A/B	25	18	14	14	11	11	8	4	14
1961	A	1	2	4	4	4	6	3	2	3
1966	B/A	14	5	6	8	5	6	4	3	7
1967–8	A	16	6	4	3	5	9	14	10	8
Mean for all epidemics		*12*	*10*	*9*	*8*	*7*	*8*	*7*	*4*	*8*

Individual susceptibility. During the 20 years there are records of ten individuals (now aged 44–68) who had suffered attacks of influenza in three epidemics, 415 in two epidemics and 2,825 in a single epidemic.

Complications. As an illustration of the relative benign nature of influenza now, it is notable that during the eight epidemics with known infections affecting 3,250 indi-

viduals there were only seven *deaths* that could be attributed to influenza—and four of these occurred in an old ladies' home in 1967–68. This is a fatality rate of 0.2 per cent.

Chest complications were not infrequent and occurred in 11 per cent of attacks. The chest complication rates varied with the epidemic (table III), but the reasons for high and low rates are not clear. The low rate of three per cent for the most widespread epidemic in 1957 may have been because it occurred in the autumn, whereas the other epidemics occurred chiefly in winter months.

TABLE III

CHEST COMPLICATIONS IN INFLUENZA EPIDEMICS (IN PERCENTAGES OF ATTACKS)

Year of epidemic	*1950–1*	*1953*	*1955*	*1957*	*1959*	*1961*	*1966*	*1967–8*	*All epidemics*
Percentage	*20*	*12*	*10*	*3*	*10*	*14*	*9*	*9*	*11*

The usual clinical types of chest complications (table IV) were acute bronchitis and segmental pneumonia. Acute bronchitis was noted chiefly in the young and the elderly. In the elderly (over 60) it was the chronic bronchitics who most often suffered from acute bronchitis. Complicating segmental pneumonias were distributed equally at all ages. The rates of the clinical types of complications were similar in the eight epidemics.

TABLE IV

CLINICAL TYPES OF CHEST COMPLICATIONS IN INFLUENZA EPIDEMICS (1949–1968) (PERCENTAGE OF ATTACKS)

Clinical type	*Acute bronchitis*	*Segmental pneumonia*	*Lobar pneumonia*	*All chest complications*
Percentage of attacks	*4*	*6*	*1*	*11*

Children and elderly persons were most liable to chest complications (table V) and again there were differences in each epidemic.

TABLE V

CHEST COMPLICATIONS IN INFLUENZA EPIDEMICS AT VARIOUS AGES (IN ATTACK RATES PER 100)

Age (years)	*Type*	*0–*	*10–*	*20–*	*30–*	*40–*	*50–*	*60–*	*70+*	*All ages*
1950–1	A	20	5	3	5	15	25	40	75	20
1953	A	10	5	5	5	7	10	15	30	12
1955	B	5	5	3	5	10	10	20	50	10
1957	A	2	2	3	3	2	5	9	15	3
1959	A/B	10	4	4	4	7	10	36	73	10
1961	A	36	6	10	8	5	15	27	44	14
1966	B/A	6	3	2	7	9	13	20	59	9
1967–8	A	3	2	3	7	5	9	14	40	9
All epidemics		*12*	*4*	*4*	*6*	*8*	*12*	*23*	*48*	*11*

Discussion

Although each influenza epidemic has its own character there is a pattern common

to many such epidemics. An epidemic of influenza tends to last in this area for between two and three months. Beginning slowly the epidemic reaches its peak in four or five weeks and then subsides slowly. The extent and severity of any attack will depend on factors such as the strain of influenza virus, on the state of the host-immunity of the population and on the timing of the epidemic; the fatality and complication rates are always higher during the cold and foggy winter months. The effects produced are widespread and nationally paralysing. The 'Asian' influenza epidemic of 1957 is estimated to have caused 5,000 deaths in the United Kingdom and to have cost upwards of £100 millions. The influenza pandemic of 1918–1920 caused more deaths than the Great War.

During 20 years in my practice the extent of each of the eight epidemics ranged from three to 17 per cent of the patients consulting (a mean rate of eight per cent). The true incidence was very much higher because by no means all patients who were infected needed to consult, and it is likely that twice as many were infected than consulted. Of 2,950 persons who have been in the practice for 20 years, 1,272 were seen for epidemic influenza at least once. With the exception of the epidemic of 1967–8, the age distribution of influenza is that it tends to be an infection of children and teenagers and that the incidence falls with age, presumably because adults build up a natural immunity through contact with influenza over the years. Chest complications are most likely to occur in those aged 50 and over and are particularly likely in chronic bronchitics.

Any practical policy designed to prevent infection with influenza and to reduce complications must consider immunization and the use of broad spectrum antibiotics. There are special problems with each. Immunization is not completely successful because of the uncertainty of the causal strains of influenza virus in any epidemic and there is no effective polyvalent vaccine available. It is impossible to undertake any scheme requiring regular immunization of the whole population and the definition of 'vulnerables' has not been a practical possibility in general practice.

Prophylactic use of antibiotics also is impractical for the reasons of costs and the impossibility of selecting 'vulnerables'. The early use of broad spectrum antibiotics for chest complications certainly has improved the prognosis and the fatality rate of 0.2 per cent of all patients with influenza who consulted must be considered satisfactory.

Summary

During 20 years (1949–1968) eight epidemics of epidemic influenza occurred, and were studied, in a London general practice.

The incidence, as measured by patients who consulted us, ranged from three to 17 per cent of the population at risk, with a mean rate of eight per cent.

Epidemic influenza is particularly frequent in children and teenagers and there is a progressive decrease in frequency with age.

The case fatality rate from influenza during the 20-year period was 0.2 per cent.

Chest complications occurred in 11 per cent of persons infected, the liability increasing after the age of 50.

Large scale immunization and prophylactic use of antibiotics are considered impractical and unnecessary.