EPIDEMIOLOGY: A SPECIALITY OR A HOBBY?

G. I. WATSON, M.D.

General Practitioner, Corran, Feaslake, Surrey

"Let me recommend as a hobby, particularly to those young men entering country practice, this observation of the natural history of epidemic diseases."

Whether epidemiology in general practice will ever lose its amateur status I cannot foretell. I know but few family doctors in this country who regularly derive any part of their income from this source. For the rest of us it remains a hobby—and an expensive one at that, if time is taken into account. Yet those who share this interest, derive from it quite as much of value as model makers or artists do from their craftsmanship. Perhaps one year the 'Doctors' Hobbies' Exhibition will open a class for epidemiology!

A study of the relationships in time and space between similar diseases in different people lies at the root of epidemiology; it comprises more than etiology and includes the study of any noxious agent, living or otherwise, which affects our patients under different conditions.

Tools for the Job

What are the tools we use in this type of work? First, patience. Patience to take a good history about a person's illness, about the circumstances leading up to its onset, and about subsequent events; patience to examine and, before that too, to capture the interest of ordinary people who form most of our 'raw material'; patience, coupled with the eye of understanding, which does not automatically turn away from 'awkward' findings that do not fit our first impressions; patience to think over the epidemiological meaning of signs and symptoms which our hands and eyes have defined, sometimes almost without our realising it; and, finally, patience to sort and tabulate our findings, to work through the statistics and to spend rare leisure hours writing up our results, in the hope that they may be of interest to an editor and his readers.

First, patience and then adequate records: not the N.H.S. records, which are withdrawn from us if our patient dies or moves away, but our own personal private notes—in a shorthand where suitable—to which we can refer again in the future, whenever the need arises. For example, I still recall the pleasure I got from reading again the notes which I made about a youth, in whom I had diagnosed 'acute diaphragmitis' some years before I recognised my first case of Bornholm disease.

Patience, good records and, thirdly, a continuous training in the yearly more complex basic sciences, dealing with viral and bacterial agents, resistance and immunity, materia medica and statistics. We need, too, the knowledge and understanding which comes from personal contact with those who have practised epidemiological research before us. Indeed, it is often from such a person that we catch our first spark of enthusiasm.

Past and Present

The introduction of the National Health Service has removed one obstacle to all types of research in general practice, insofar as the number of a doctor's attendances on his patients is no longer governed by financial considerations. 'You won't be calling again, doctor?' used often in the old days to put a chilly end to the idea of following up an interesting case; but of course the Health Service has done nothing to benefit financially the doctor who wishes to do more than the minimum for his patient. The post-war expansion of the Public Health Laboratory Services has also greatly helped this type of work. Modern developments in virology are constantly opening up new possibilities for the family doctor, and are helping to take the 'U' out of the diagnostic remnant 'P.U.O.'

Who Benefits?

An anomaly of this type of work is that the patient being studied so carefully rarely secures any benefit for himself from our research. We may be able to warn his contacts of trouble in store for them, or cast the blame on someone else for what has here befallen. But, for example, serological results or virus isolation from collected material are unlikely to be reported before the patient has recovered; these examinations are usually for our benefit, not his, though of course
bacteriological results come through more quickly. In one instance recently, however, foreknowledge probably saved a patient from paralysis.

Two children returned last year from a summer holiday by the sea and, shortly after, took ill with headache and fever lasting a couple of days. They quickly recovered without treatment and if nothing more had been done, no-one would have been to blame. Because of my interest in pyrexia of unknown origin, however, their throat swabs were examined for viral as well as bacterial pathogen and in due course polio virus type I was isolated from both children. Each had had two injections of anti-polio vaccine six months previously and both recovered completely from their short illness now without paralysis. This knowledge that polio virus had entered the household allowed me to warn the parents, who had not been vaccinated, that any illness within the next three weeks must be treated seriously. Three weeks came and went without incident but, 32 days after the children took ill, their mother reported that her husband was in bed with a high temperature and headache. This man drove a heavy lorry and was not the type to give in easily for a mere 'chill'. Left to his own devices he would certainly have taken sufficient anti-pyretic tablets to himself to continue at work. If he had done so on this occasion, however, I am convinced that a few days later his wife would have called me, not because he had a headache and temperature, but because he was paralysed; for from him also polio virus type I was isolated on a throat swab and from faeces. If anti-polio vaccination had saved his children from paralysis, foreknowledge that their minor illness was due to this disease probably secured him like benefit, for after several days of unsuppressed fever and careful home nursing, he too recovered without paralysis.

Collective Enquiries

What other value has this type of research? Our principal objective is to add new details to the general store of knowledge about epidemic and endemic diseases. Some diseases appear sporadically so that research by a single doctor on patients affected within his own practice would require years to complete. Here a collective enquiry by many doctors, working on an agreed plan, can yield results sometimes within a few months. An example is Bornholm disease, of which a family doctor may recognize no cases for several years and then, perhaps, only see one or two affected patients in a whole summer. This was true of doctors in south-east England during 1956, but a collective enquiry by that faculty of the College of General Practitioners showed Bornholm disease to have been prevalent in a band of country stretching along the lines of road and rail from Bournemouth and Portsmouth to the London area. Yet while this was occurring, other doctors in Sussex and East Kent, and to the north of the affected area, uniformly reported having seen no cases (Fig. I).

So much is still obscure, even about the commonest infections. For example, in studying over 4,700 patients with measles, some of whom were under treatment with a variety of drugs, a group of 137 family doctors found unexpectedly that 'mild' attacks were particularly common in
young infants and that, even up to the end of two and a half years, such attacks were
commoner than in older children. The proportion of 'mild' cases was significantly
higher among breast-fed infants than among the bottle-fed in all groups up to the age of 30 months;
over the whole period up to the age of five years, the incidence of mild cases was 36.4% of 1,184
breast-fed patients but only 29.7% of 1,154 bottle-fed patients—a difference which again is statisti-
cally significant (Fig. 2). The proportion of 'severe' cases, however, did not seem to be
affected by breast feeding nor did the incidence of such cases vary significantly in either group
over the first five years. These incidental findings should influence the use to which gamma globulin
is put in protecting the contacts of patients with measles, and clearly demonstrate one striking
advantage which the breast-fed infant has over its bottle-fed siblings and neighbours.

**Research into Common Diseases**

Research into features of common epidemic
diseases can be equally tantalizing. Influenza is
an example. Between outbreaks one has time to
think and to plan; then comes an epidemic and
for a weeks one scarcely has time to eat or sleep,
let alone carry out research. Yet, with an adaptable
system of note taking and a clear picture of one's
objective, it is possible when the storm is over to
settle down and try to bring order out of seeming
chaos. Take the case of the M-shaped, or saddle-
back, diphasic pattern of temperature chart in
influenza.11, 12 I have been puzzling over its
meaning since I first recognized it in 1951. Re-
peated examples were to be seen during the Asian
'flu' epidemic in 1957-58. With help from the
laboratory for serology and virus isolation, I hoped
to learn more about the meaning of this 'signature'
of influenza. When I assembled my results, however,
the findings with regard to virus isolation (8 posi-
tives out of 21 attempts) appeared at first to con-
fuse rather than help. Two charts were particu-
larly difficult to understand (Fig. 3). In the sister
I failed in two attempts to isolate virus, yet by the
same technique and at the same time I succeeded
on both occasions in her brother. It was only
later, when I came to draw a chart of an imaginary
rise and fall in temperature, on which I marked
my positive and negative results in relation to the
phase of fever reached by the patient at the time
when virus isolation was attempted, that light
was shed on these and other findings (Fig. 4).
Influenza virus was isolated from the upper respi-
atory tract on 8 occasions out of 10, when the
patient's temperature was 100°F. or over at the
time of sampling, but in those with lower tempera-

---

**Fig. 3.**

**Fig. 4.**
tutes all 11 samples were negative. When my visit had coincided with the peak of fever I succeeded in collecting a positive specimen on each of four occasions; but in contacts before whose temperatures rose and in convalescents whose fever had ended, my results were negative in each of six attempts. Such a distribution of positive and negative results can hardly be haphazard but suggests some connection between the phase and height of fever and the ease with which influenza virus can be isolated from the upper respiratory tract of infected patients.

Returning now to the meaning of the M-shaped or biphasic temperature chart of influenza, I have postulated\textsuperscript{14} that this second rise of temperature may be due to a re-invasion of the patient's respiratory tract by influenza virus, which has come to maturity in and been liberated from his own epithelial cells, becoming free to invade either another person or the original patient again. In other words, it seems possible for a patient to contract a second bout of influenza from himself, before his immune reaction can protect him.

Fig. 5 shows the chart of a daughter and her mother, each of whom had biphasic temperature reactions. The girl's second spike synchronized as closely as one could have expected with her mother's first spike, if they were in fact each due to a second generation of virus which had grown to maturity over the same period, one in the girl and the other in her mother. The chart shows that the mother's second spike followed after precisely the same interval, and—coinciding with it—there is the suggestion of an abortive third spike in the daughter.

**Duration of Infectivity**

A study of the duration of infectivity can be fascinating but difficult. Take measles, for example. We all know that a child with measles is highly infectious before the rash appears, but we know a great deal less about his infectiousness from the time he goes to bed. Is he equally infectious two days after the rash has appeared, on day R+2, when his temperature is beginning to fall? Has he ceased to be infectious on R+5 or 6 when the rash has faded? At present the only way to get an answer to such questions, apart from waiting for chance encounters, is to encourage parents to allow their children to visit friends with measles on a particular day after the rash has appeared, in the hope of contracting the infection by design rather than by accident. In the future, when measles virus is more easily handled in the laboratory, it may be possible to study the problem precisely, as we can now do with the enteroviruses. It may even be possible to order a dose of measles virus from cold storage so that 'Billy' or 'Mary' can be given an attack of measles when convenient for the family, rather than catching it haphazard at the most awkward moment! Dr. George Swift\textsuperscript{13} has reported the persistence of Coxsackie virus type B.1 in faeces for 12 to 18 days in three out of five patients who were tested twice. From a patient of mine last December, Dr. G. Cook of the Guildford P.H.L.S. laboratory isolated adeno-virus type 3 during convalescence from faeces on three occasions, the last being 22 days after the onset of fever.

**Serial Intervals**

Another way of gathering evidence about the duration of infectivity of a patient is to measure the 'serial interval' between his illness and that of his contacts. This has been well described by Dr. Hope-Simpson\textsuperscript{8} and is the interval between a characteristic phase in a patient's illness and the similar phase in the illness of secondary cases. It thus differs from the 'incubation period', which is the interval from the moment of infection to the
onset of illness in either primary or secondary cases. Fig. 6 is a histogram of the serial intervals between primary cases and the earliest secondary cases in 50 families affected by Asian influenza. If we accept 48 hours as the standard incubation period of influenza, then a serial interval of 10 days as shown in this figure indicates that these two patients were infectious for eight days after the onset of symptoms. The great majority of patients appear to have become infectious only at the onset of their illness, and not before. Many appear to have been infectious for as many as four days from the onset of symptoms, some for longer.

The Future

'No consulting physician can ever have the opportunity to follow the whole course of such a disease as epidemic myalgia in the same way as the general practitioner, because of the latter's more intimate association with his patient.'

The need is as great as ever, particularly for doctors in general practice, to study closely those patients who are affected by either large or small outbreaks of hitherto unnamed fevers, and to publish reports of their findings. There is also a limited need for samples of pathological material, collected during the more unusual of such outbreaks, to be stored frozen under suitable conditions against the day when new viruses can be tested against such material. On more than one occasion in recent years general practitioners have published careful descriptions of unusual epidemic diseases which affected their patients, from none of whom was any recognizable infective agent isolated.

If the number of family doctors interested in clinical epidemiology is to be increased, more students and young graduates should be encouraged to seek an opportunity of working with those who are already doing research in general practice. This might entail designating suitable practices up and down the country as 'research practices', to which senior graduates might be appointed as 'research registrars', in line with the trainee practitioner scheme elsewhere. This might be one way of meeting a growing need for more post-graduate teaching for those who wish to learn something about methods of epidemiological research in the field. If more family doctors take an interest in this type of work, the need will soon be felt (if it is not already) for the establishment of more than one fully equipped research laboratory in different parts of the country, wholly at the service of general practitioners who are doing either epidemiological or therapeutic research. The pharmaceutical industry might be invited to bear some part of the cost of equipping and running such laboratories.

And finally, even if epidemiology in general practice continues to retain its 'amateur status', there is a pressing need for some generous benefactor to endow many more prizes and research scholarships for family doctors, to encourage the persistent and entice the faint hearted.

Acknowledgement

I am grateful to the Editor of the Journal and Research Newsletter of the College of General Practitioners for permission to republish the figures which accompany this article.

REFERENCES

3. Epidemic Observation Unit (1955), Ibid., 8, 80.
10. PICKLES, W. N. (1939b), Ibid., 8.
Epidemiology: A Speciality or a Hobby?

G. I. Watson

doi: 10.1136/pgmj.36.415.317

Updated information and services can be found at:
http://pmj.bmj.com/content/36/415/317.citation

**Email alerting service**

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Notes**

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/