

Telematics: a new tool for epidemiological surveillance of diarrhoeal diseases in the Aquitaine sentinel network

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Abstract

A sentinel health information system using telematics and a network of general practitioners was set up in Aquitaine in south western France in 1986. Among the health problems under surveillance was acute diarrhoea. Data for each patient who fulfilled the usual case definition for acute diarrhoea were reported by general practitioners using home terminals (Minitels) connected to a central computer by telephone. Over one year 2234 cases of diarrhoea were reported, the incidence varying from 0.8 to 1.5 cases per doctor per week. Seasonal variations in incidence were observed, with peaks in the winter and in the summer. Only 379 (17%) episodes of diarrhoea were classified as severe, and these patients consulted their general practitioners earlier than patients whose diarrhoea was less severe. Foreign travel was rarely found in the patients' histories, but clusters of cases were found in communities (4.6%) and in families (22.3%). The advantages of this system were easy reporting and immediate feedback, but it was difficult to extrapolate the data, and the system was inadequate for intervening in outbreaks of diarrhoeal disease. Our knowledge of diarrhoeal diseases in south west France improved.

Introduction

In developed countries diarrhoea is a common self limiting disease which in most cases does not require admission to hospital except during childhood. Because

it is usually treated by a general practitioner the incidence and characteristics are not well documented. As food processing is being done on a large scale more and more outbreaks are being reported, and the economic cost of sporadic episodes of diarrhoea is estimated to be high.¹

In France a new system of data transmission was developed recently called telematics. This allows communication between a home terminal (Minitel) and a computer using telephone lines. A large range of telematic services, including an electronic phone book, became available after Minitels were widely distributed by the French Company of Telecommunications (PTT). These terminals allow easy access to data banks and networks by dialling from anywhere in the country, and the cost is not affected by the distance between the terminal and the host computer.

We decided to apply this information system to the epidemiology of diarrhoeal diseases through a network of general practitioners in Aquitaine in south western France. The objectives were to improve the collection of data on diarrhoeal diseases and to evaluate the interest in using this health information system.

Methods

The sentinel network was initiated in October 1986 in the Aquitaine region, the third largest region in France by area with 2 720 000 inhabitants. The network relies on a representative sample of general practitioners making up 5% of the total number of general practitioners in Aquitaine.

Each participating general practitioner can send data to the network 24 hours a day, seven days a week. A minimum of one connection a week was requested—even when there were no new cases to report. Acute diarrhoea was one of four topics selected for surveillance in the first year. A case of diarrhoea was defined as more than three liquid stools a day for more than one day and less than 15 days.² The criteria concerning the severity of diarrhoea were: weak, <5 stools a day or temperature of <37.5°C, or both; moderate, 5-10 stools a day or temperature of 37.5-38.5°C, or both; severe, >10 stools a day or temperature of >38.5°C, or both. General practitioners completed a questionnaire for each case, which was displayed on their screens (see box). The data were collected in a host minicomputer at Bordeaux University Medical Centre. Additional data were gathered by telephone each time clusters of cases were reported. Regular feedback was provided to the participating general practitioners and public health officials through Minitel and monthly written bulletins.

Results

We considered a participating general practitioner to be one who made at least half the expected number of

Questionnaire completed by general practitioners for each patient with acute diarrhoea: Aquitaine sentinel network 1986-7

Age (years):

Sex:

At the time of the consultation:

For how many days has the patient had diarrhoea?

Are the episodes of diarrhoea weak, moderate, or severe?

Possible answers: Yes, No, Do not know

To your knowledge:

Are there any other cases of diarrhoea in the family?

Are there any other cases of diarrhoea in the community where the patient is working or studying?

Has the patient visited countries overseas in the past two weeks?

Does the patient have a history of chronic intestinal symptoms?

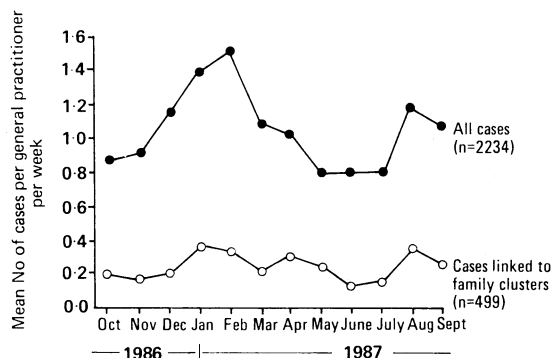
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weekly connections during a three month period; 83 general practitioners participated in the network.

Among the 2260 episodes of diarrhoea reported during one year of surveillance (October 1986 - October 1987), 26 did not fulfil the criteria of a duration of under two weeks; thus, 2234 cases were analysed. The incidence of reported cases varied from 0.8 to 1.5 per general practitioner per week. Seasonal variations were observed, with peaks occurring in winter (1.5 cases per general practitioner per week in February) and in summer (1.2 cases per general practitioner per week in August) (figure).



Mean number of cases of acute diarrhoea reported each month by general practitioners and mean number linked to clusters of cases in families

The mean (SD) age of males was 27 (22.6) years and of females 33 (25.6) years ($p < 0.01$). Table I gives the age distribution of cases. The sex ratio (M:F) was 0.95.

TABLE I—Distribution of cases of diarrhoea by age and sex: Aquitaine sentinel network

Age group (years)	Male	Female	Total No (%)
0-9	365	289	654 (29)
10-19	138	113	251 (11)
20-29	107	165	272 (12)
30-39	171	152	323 (15)
40-49	104	93	197 (9)
50-59	90	106	196 (9)
60-69	60	87	147 (7)
70-79	35	83	118 (5)
80 and over	20	56	76 (3)
Total No (%)	1090 (49)	1144 (52)	2234 (100)

Only 379 (17%) cases of diarrhoea were classified as severe; 1274 (57%) were moderately severe and 581 (26%) were mild. Consultation occurred earlier when the symptoms were more severe: four fifths of these patients saw their general practitioner within 48 hours of the onset of symptoms compared with just over two thirds of those with moderate or mild diarrhoea. ($p < 0.001$).

In 344 cases (15%) patients had a history of intestinal symptoms. This finding was independent of the sex and of the duration of diarrhoea before consulting the doctor.

Travelling abroad was found in only 2% of patients' histories. The incidence of cases in communities ($n = 104$) and in families ($n = 499$) was high, representing 4.7% and 22.3% of all cases reported (table II).

TABLE II—Distribution of cases of acute diarrhoea by age and within communities and families

Age (years)	No (%) of cases linked to:		All cases (n=2234)
	Family clusters (n=499)	Community clusters (n=104)	
0-3	96 (19)	20 (19)	361 (16)
4-19	161 (32)	33 (32)	544 (24)
20-64	213 (43)	34 (33)	1090 (49)
65 and over	29 (6)	17 (16)	239 (11)

Discussion

A national health information network composed of general practitioners and using Minitel had already compiled data on infectious diseases under the auspices of the Ministry of Health. Originally, 250 general practitioners chosen nation wide were included in this network to provide data on selected communicable diseases.³

The regional network in Aquitaine that we have described, sponsored by the regional health authorities, was organised in the same way to provide reliable and original data on potential health problems in south west France.⁴

Compared to the more traditional ways of reporting diseases,⁵ this system makes it easy for doctors to report information quickly and gives them immediate feedback.^{6,7} The main problem is the difficulty in estimating incidences of disease in whole reference populations from the results obtained through such a surveillance system. In France general practitioners work in private practice and the population is not registered with a doctor. Therefore, administrative boundaries do not reflect catchment areas. There may have been selection bias for the general practitioners participating in this system as only half of them were chosen randomly, and among those originally selected only a fifth agreed to participate. Extrapolating the findings by using the total number of doctors in the region is valid only for rare and severe diseases which are not likely to be underreported. Another problem concerns the possible lack of need to connect with the network every week when a general practitioner has no cases to declare to differentiate from other weeks when he was not working. There is no simple way to control this potential bias. Contrary to other types of surveillance,⁸ we decided to avoid such extrapolations for acute diarrhoea.

Diarrhoeal diseases are known to occur often, but the extent of the problem in industrialised countries is not clear. In a previous study on the reasons for seeking medical attention in the same region diarrhoeal disease was found to represent 2.6% of the total number of consultations with general practitioners.⁹ In France it was estimated to be the reason for 1% of all consultations with general practitioners in 1981.¹⁰ In the United States Moffet showed a frequency of 10-15% of intestinal infections among all infections seen in ambulatory patients.¹¹

Diarrhoea is a common symptom but the risk is different at different ages. As expected, we found that a large number of children consulted for diarrhoea, although in urban areas many children with diarrhoea are seen by paediatricians and not by general practitioners. In adults, however, diarrhoea is thought to be of little importance and was probably underestimated by a general practitioner surveillance system because people tend not to seek medical attention for it.

Distribution over time showed two peaks of seasonal variation. One was in late summer and was probably linked to the higher incidence of bacterial diarrhoea, which can also be seen in laboratory reports. The major peak that occurred in the winter is more difficult to explain. This was already noted in a previous study⁹ and in the statistics of drug companies on the use of anti-diarrhoeal drugs. It is more likely to be associated with viruses such as rotaviruses, the Norwalk-like agents, and others.¹²

We found that 104 of the cases of diarrhoea were part of a community outbreak. The community could be a nursery, a school, a restaurant in professional settings, or a retirement home. These cases are most likely to be foodborne even if person to person transmission also occurs. This surveillance system is probably not the best way to detect outbreaks, partly because the sample is too small. It works well for detecting epidemics such

as influenza,¹³ which is caused by one strain that spreads quickly over an entire region or country and has a single mode of transmission. It cannot be used alone for the surveillance of outbreaks evolving in an endemioepidemic pattern such as in a *Salmonella enteritidis* outbreak because there are no data on the aetiology of the episodes. This system should therefore be combined with a laboratory network to achieve maximum efficiency. The 104 potential outbreaks in communities reported through this network by about 100 physicians, however, shows that the frequency of such outbreaks in France is underestimated. In 1988 only 309 outbreaks in 6331 patients were reported for the entire country through mandatory notification.¹⁴

We think that it would be both feasible and useful for public health authorities to establish a health information system using telematics through a network of private doctors, general practitioners in particular. It would be useful especially for infectious diseases, providing baseline information that might not be available by other means. Linking the system to the reporting of notifiable diseases and laboratory surveillance would give a more complete picture of a public health problem, though not necessarily provide the best tool to control interventions. This telecommunication system is likely to be reproduced in other countries. The experience gained in France through regional and national networks may be of interest to other countries wishing to strengthen their health information systems.

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ONE HUNDRED YEARS AGO

The Act passed in the last session of Parliament dealing with the above subject will be a matter of considerable interest to members of the medical profession, and may be of great importance to the public generally. The Indecent Advertisements Act will, we hope, exercise a wholesome check upon an evil which, it is to be regretted, has been permitted for so long a time to exist.

Hitherto the Statute Book has contained no provisions to protect the public from being brought into contact with the class of advertisements to which the Act refers, and which have been so largely exhibited and distributed in public places in recent years.

The only law relating to the subject was contained in the Act passed in the fifth year of King George IV, intitled an "Act for the Punishment of Idle and Disorderly Persons and Rogues and Vagabonds in that part of Great Britain called England," under which every person wilfully exposing to view in any street, road, highway, or public place any obscene print, picture, or other indecent exhibition might be imprisoned for a period not exceeding three calendar months. This Act was amended in the year 1837 so as to include a "window or other part of a shop or other building situate in any street" within the provisions of the principal Act. These enactments, it is obvious, did not extend to the practices which the present Act was passed to suppress.

The Act in question comes into operation on January 1st, 1890, and it is provided that any person shall, on summary conviction, be liable to a penalty not exceeding 40s., or, in the discretion of the court, to imprisonment for a period of not longer than one month, with or without hard labour, who affixes to or inscribes on any house, building, wall, hoarding, gate, fence, pillar, post, board, tree, or any other thing whatsoever so as to be visible from any street, public highway, or footpath, or whoever affixes to or inscribes in any public urinal, or delivers or attempts to deliver, or exhibits to any inhabitant or to any person being in or passing along any street, public highway or footway, or throws down the area of any house, or exhibits to public view in the window of any house or shop any picture or printed or written matter which is of an indecent or obscene nature.

It is also expressly declared that any advertisement relating to syphilis, gonorrhœa, nervous debility, or other complaint or infirmity arising from

or relating to sexual intercourse, shall be deemed to be printed or written matter of an indecent nature within the meaning of the Act.

The person who gives or delivers to any other person any such indecent picture, or printed or written matter, with the intent that the same should be so affixed, inscribed, delivered, or exhibited, is liable to a penalty not exceeding £5, or, in the discretion of the court, to imprisonment for a term of not more than three months with or without hard labour. The punishment provided for the principals who issue such advertisements may possibly be considered to err on the side of leniency, but the power given to award imprisonment instead of a fine will possibly have great weight in carrying into effect the objects of the Act. Any constable or other peace officer is empowered to arrest without warrant any person whom he finds committing any offence against the Act, and proceedings may be taken against offenders in the courts of summary jurisdiction, that is, in London, the police courts.

Proceedings are directed to be taken in manner provided by the Summary Jurisdiction Acts, under which the first step is to attend before a magistrate, and, what is technically termed, lay an information, which consists in stating the grounds of complaint either verbally or in writing. If the magistrate thinks the information sufficient he will issue a summons, returnable on a certain day, when the case will be disposed of. The magistrate also has power to award costs to the successful party. The Act may indirectly have the effect of doing more good than at first sight appears, for it will, if we mistake not, greatly interfere with the business of that class of men from whom the advertisements in question emanate, and thus attack the root of the evil. Medical men have greater opportunities than others of knowing what mischief is done by means of these advertisements, and we think they may be relied on to set the law in motion in any case of violation of the provisions of the Act coming under their notice. It may, of course, entail inconvenience and loss of time to lay information, and to attend in support of summonses obtained; but, knowing how great a benefit will be conferred on the public if these advertisements are stamped out, we feel sure that medical men will not suffer the Act to remain a dead letter for fear of incurring a little trouble and annoyance in putting the law in force.

(*British Medical Journal* 1890;i:27)