PRACTICE OBSERVED

Practice Research

Mapping practice population and morbidity with a computer

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Abstract

A method of dividing a map of the practice area into a grid based on postcode locations is described. The distribution of the practice population may thus be shown graphically and trends observed. The geographical incidence and prevalence of morbidity may also be charted and variations of statistical significance determined. This is a practical tool that will have greater potential as information technology in general practice develops.

Introduction

A distinctive feature of general practice management in the United Kingdom is the care of a small, definable population that is relatively static.[1] This enabled our practice to develop an index of households on its computer system, which has proved of value in daily work in selecting patients at particular addresses. The many other uses range from identifying elderly patients who live alone to finding control patients matched for age, sex, and household and listing the practice population by address.[2] Using postcodes we were able to identify the numbers of patients in particular areas of the practice and note changes over time. A logical extension of this was to use the computer to plot the actual location of the practice population or any data subset selected by the usual interrogation software.

Jarman used 1981 census data to identify underprivileged areas by manually plotting composite scores of selected social variables onto maps of electoral wards.[3] Kay recommended using postal codes for morbidity analyses so that data can be aggregated among practices to district and even regional and national levels.[4] A method based on the postal code is described here in which electronic handling was used both to aggregate into areas and to display geographically information from a practice databank.

Method

Our practice has been using a computer system written for the practice that runs on a TRS-80 Model III with hard disk storage and an Epson dot matrix printer.[2] The data set for each patient is name, sex, age, address, marital state, social class, recall dates for cervical smears and blood pressure, etc, and long term medication. There is also a problem summary, which is coded but has added free text and a date so that it is flexible in both inputting and retrieving information. We had already achieved considerable accuracy with addresses and postcodes and had several computer routines that made comparisons and produced short lists of possible errors. The household index is based on the postal code and the number or house name

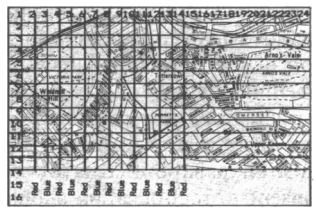

FIG 1—Map of practice area, showing row and column numbers connected by coloured lines.

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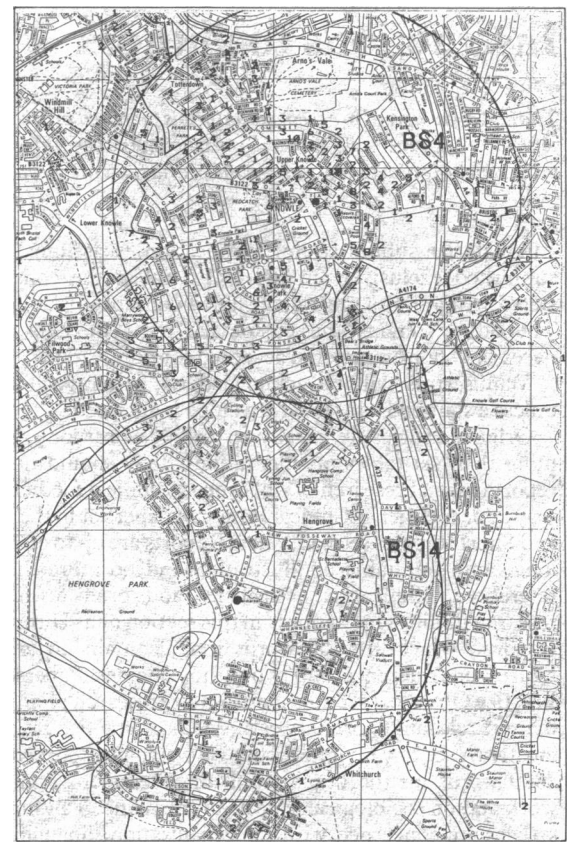

FIG 3—Practice population of children under age 5 years, charting 517 children.

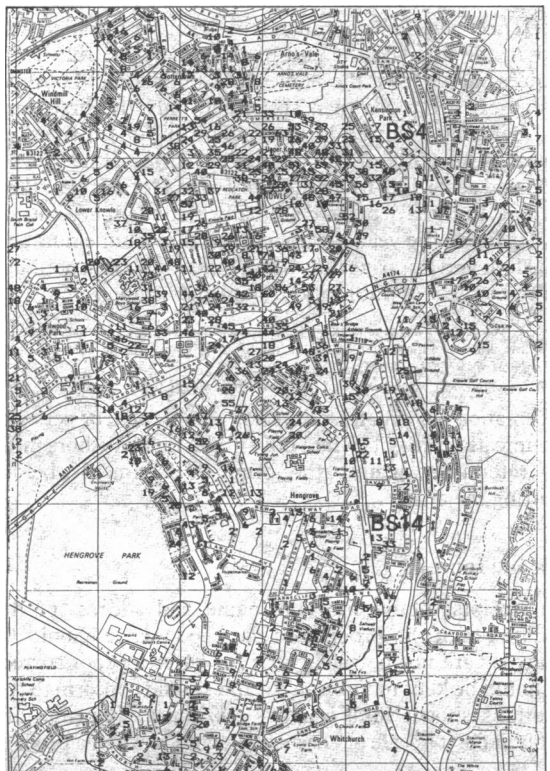

FIG 2—Map of total practice population charting 9361 patients.

and the first three letters of the street. A further program used the household index to identify all 850 different postcodes used for patients' addresses, together with the range of street numbers they represented. In this way a few further inaccuracies were recognised because the orderly sequence throughout the practice area was broken. Only at this stage were data sufficiently correct to make it possible to develop a practice postcode grid.

A map of the practice area of suitable scale was chosen, the limiting factor being the number of characters per line on the printer, so that for an 80 character printer the map could be no wider than 8 in. A copy was made onto A3 paper and the computer was used to print the row and column numbers of the grid. These were connected by alternate coloured lines to facilitate reading references (fig 1). Accuracy is ensured because the same printer spacing codes are used to produce both the working grid and subsequent mapping printouts. Postcodes have no logical connection with map grid references, and it is therefore necessary for programming logic to state the correct vertical (row) and horizontal (column) square for every postcode. This may be greatly facilitated, however, by using one program to generate another. This program generator requires the user to enter the reference for each postcode in turn, upon which the appropriate computer coding is automatically generated. In practice the doctor who is familiar with his own practice area from visiting can do this most effectively, and it is made easier because in the household index most post "walks" are adjacent. This once-only task took three hours, however, followed by appropriate modification to become a standard part of the practice system.

Data interrogation programs offer several choices in producing their output. Thus our system may count only, list alphabetically, or list in order of date of birth and may create mail merge text or labels. To this is added the option of mapping by storing postcodes of every positive find in the search and subsequently mapping them, the additional mapping taking about one minute. The paper is fed into the printer as cut sheets and is headed with an appropriate routine to align the printing. New addresses may of course appear that are not mapped by the computer, but the software can identify these for both immediate alteration of the display and long term alteration of the software.

Results

Figure 2 shows the result of mapping the entire practice population and fig 3 the mapping of patients aged under 5 years. The number of patients is printed into each 88 yd by 86 yd[2], alternate numbers being offset to avoid them running into each other. An alternative would be to use the dot graphics capability of the printer to represent patients by dots, but this did not give a better overall picture and implies more accuracy than is possible. Some postcodes extend over several grid squares and some squares display more than one postcode, but to attempt more detail on the basis of our index of every household was clearly unnecessary. Figures on the right and left borders include those out of range of the map—a 12 in wide printer could overcome this problem. Every possible practice subset may be displayed, but small numbers are not worth while.

Discussion

These maps have produced more immediately favourable reaction than many of our other computer outputs, perhaps because of their local identification. We used the mapping of the children under 5 in our practice to support graphically our views about basing the services of health visitors by counting the numbers in circles around the two largest centres. Another application was to identify all the patients aged 75 and over who lived some distance from the surgery. We similarly mapped the prevalence of our patients who have asthma and hypertension. Using our archived files as well as our current files we can derive the yearly incidence and then map the cumulative incidence over several years.[5]

In addition to purely descriptive mapping, however, measurements may be made of variations of possible importance using the geographical location as an explanatory variable. To do this the denominator of the proportion of patients with the possible dependent variable cannot be the area itself because of variations in the density of housing in the practice. The computer, however, calculates areas of equal density by using the entire practice population or, where there may be associated variables, by using a subset of patients that excludes these variables—for example, a subset of an age range for hypertensive patients. The computer can search for areas of most importance. We found that in an area corresponding to our housing estate with the lowest socioeconomic level significantly fewer patients with asthma had been identified by the practice ($p<0{\cdot}001$). Clearly, this is something to consider in consultations with patients from this area. This method will be expanded in a further paper.

Mapping software requires individual programming for a practice but once written is easily maintained. The user needs only to keep accurate addresses. Such a tool was produced by in practice software on an out of date computer and has even more potential with better information technology. Most practices record only major morbidity at present, but when more consultations are recorded it should be possible to show geographical clustering in the pattern of infections and other illnesses, especially if aggregated with the results of other practices. For example, a group of symptoms may be recognised as occurring more often than usual and mapping may indicate where further investigation would be most fruitful, allowing much more precision when "there's a bug going around." Such mapping capability is a feasible application of future computer systems in general practice.

Refereaces

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3 Jarman B. Identification of underprivileged areas. *Br Med J* 1983;286:1705-9
4 Kay CR. In: *Classification of diseases, problems and procedures.* Occasional paper 26. London: Royal College of General Practitioners, 1984.
5 Difford F. Cutting a long story short. *Practice Computing* 1985;8(2):28-31.

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Multicultural medicine

Thumbs up—Clear non-verbal communication between a doctor and his patient is essential for good rapport. If a consultant or a general practitioner of one ethnic group communicates with a patient of another it is essential to know that they have correctly interpreted the sign language. Thumbs up symbolises "OK" or success in Britain and North America, but it is considered a very rude sign by Belgians, Greeks, and Asians, and is equal to swearing. Just imagine what could happen when a Greek Cypriot or an Indian patient consults an English doctor. At the end of a very successful consultation, the doctor gives him the thumbs up sign!—BASHIR QURESHI, general practitioner, Hounslow, Middlesex.

Spitting and culture—A practice, if everyone is doing it—even if it is wrong—becomes socially acceptable. In the West, smoking has been very popular and the general practitioners either provided an ash tray or put a notice "No Smoking Please" in their waiting rooms. In the Asian subcontinent and Greece, however, spitting on the ground is a social habit. In Eastern culture "betel chewing" is popular and it is customary in general practice surgeries to provide a "peek-dan" (a receiver) or a health education talk.

The World Health Organisation has been organising "anti-spitting" weeks in the third world countries. Spitting is detested in Europe, but the ingestion of saliva is considered interesting in Asia and Africa. There is a conflict where these two cultures meet which, I believe, may be avoided by mutual understanding. In Bradford, where many ethnic Pakistanis live, there are notices in Asian languages in public places "Spitting is forbidden." The London Borough of Ealing is tough and in Southall, where there is a large population of ethnic Indians, the notices on lamp posts read in English only "Spitting on Footways: Penalty £50."

In Britain, a private practitioner will probably opt for providing a "peek-dan" or receiver but an NHS general practitioner may choose to put a notice "No Spitting Please." Nevertheless, the importance of health education cannot be over emphasised.—BASHIR QURESHI, general practitioner, Hounslow, Middlesex.