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General practice computing in Scotland

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Abstract

Objective—To investigate a method of assessing the extent of routine patient data held on computer by Scottish general practitioners.

Design—An "electronic questionnaire" in the form of an interrogation questionnaire was used to extract a subset of data from practice computers running a standard software package (the general practice administrative system for Scotland, GPASS). The data were retained by each practice and also collected and analysed centrally to produce regional and national data.

Subjects—All 257 general practices in Scotland using GPASS software were sent the electronic questionnaire; data from 154 practices, including 759 general practitioners and covering 1 010 452 patients, were collected.

Results—Ninety three practices had all their patient records on computer; others had selectively entered data on, for example, only those patients receiving repeat prescriptions. The number of computerised patient records per practitioner ranged from 46 to 2373. Altogether 194 261 patients had repeat prescribing data and 204 005 morbidity or clinical data.

Conclusion—An electronic questionnaire is a simple and effective way of investigating the information held on practice computers, allowing analysis and feedback of information to practitioners. Development of this system will provide a cumulative information system for Scottish general practitioners.

Introduction

The importance of and preferences for information systems for general practitioners have been emphasised and described.^{1,2} Participation depends on the ease of data collection, and it has been estimated that twice as many United Kingdom general practitioners would participate in performance review activities if information were indirectly provided rather than provided by themselves.¹

An upsurge in the use of computers in general practice in Britain has occurred in recent years,^{3,4} and proposed changes in the organisation of the NHS are likely to accelerate this development.⁶ The most commonly computerised aspects of general practice are registration, repeat prescribing, simple patient recall, and practice audit.⁵ More than 15 types of computer software systems are estimated to be in use in general practice in the United Kingdom.¹

Scotland is fortunate in that it has both an NHS information technology policy and a standardised

general practice computer software system GPASS (general practice administrative system for Scotland).⁷ This is a set of software programs developed from pioneering work by Dr David Ferguson in the early 1980s on computerised repeat prescribing in Glasgow. Since 1984 the use of the software has been supported financially by the Scottish Home and Health Department and is available free to all general practitioners in Scotland who choose to buy compatible computer hardware. The programs currently support the core functions necessary for a surgery system, providing an age-sex register and facilities for repeat prescribing, morbidity recording, recall of patients, and audit.⁸ By the middle of 1988 there were over 250 registered users amounting to a quarter of all practices and over 32% of general practitioners in Scotland.⁸ It was estimated that over 1 600 000 patients (30% of the population of Scotland) were registered with practices using GPASS.

The number of registered users continues to grow steadily and now exceeds 350 practices. The use of common software means that data on patients are stored in a standardised and transferable way. This compatibility has exciting possibilities and led us to investigate the methods by which the data could be amalgamated and compared for the benefit of practices.

Methods

We sent an "electronic questionnaire" to all registered users of GPASS in Scotland during June 1988. The questionnaire was an interrogation program written by a member of the GPASS team and designed to identify how each practice was using the software. It was supplied on a floppy disk with instructions for use. When the program was run it produced an analysis of the data held on the system, both as a printed copy and electronically as a data file on the floppy disk. The material obtained reflected the overall clinical and administrative data on the practice computer rather than detailed information about individual patients. Confidentiality was assured by the omission of identifiers for patients in the returned data. Each practice retained a copy of the printed results. The floppy disk and one copy of the printed results were returned to the investigators for analysis.

Over 50 items of information were collected from each practice, including the number of doctors using the computer, the number of patients' records held, and the percentage of patients with a drug record, a clinical record, or other details such as blood pressure, cervical cytology results, and last consultation date. This information was amalgamated, analysed, and included in a report circulated to each practice two months later. The feedback was personalised for each

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TABLE 1—Data obtained from the electronic questionnaire on the variation between practices in the percentage of patients with a drug record

% Of patients with a drug record	No of practices
≤10	24
–20	54
–30	46
–40	15
–50	6
–60	1
–70	0
–80	0
–90	2
–100	6

TABLE II—Reason for failure to return or run the electronic questionnaire

	No of practices (n=103)
Reason not given	35
GPASS system not operational	18
Second sytem/duplicate information	18
Questionnaire not received	10
Technical problems	8
System holds on research data	5
Other	5
Questionnaire returned late	3
Declined to cooperate	1

practice and presented in both a national (table I) and a regional format.

Results

A total of 257 electronic questionnaires were distributed and 154 were returned completed. Sixty seven of the 103 practices that failed to return the questionnaire were unable to comply for an operational reason and only one practice formally declined to take part (table II). The 154 participating practices contained 759 general practitioners, and the data files of 1 010 452 patients were examined.

A short follow up questionnaire was returned by 143 practices. Eighty seven found the feedback excellent or interesting while 35 made no specific comment and 21 felt that the quality of the feedback, in particular the clarity of the graphical presentation, could be improved.

Ninety three practices had all their patients' records on computer while 61 practices had an incomplete patient registration database because they had not had access to an automatic download of patient registration data from their health board computer. Hence the number of patient records on computer for each general practitioner varied greatly, from 46 to 2373 (mean 1363). Eighty eight practices had installed the software before 1987 and 66 practices used it from 1987. A large volume of data was available, including information on 194 261 patients with repeat prescriptions and 204 005 patients with morbidity or clinical data. The community health index number, a 10 digit unique patient identifier in use throughout Scotland,⁸ was present in 615 703 patients' records. An example of analyses of selected clinical markers in the patients' records are given in tables III and IV. The range of these results reflects differences in practice priorities as well as the time since computerisation started.

Discussion

We believe that we have established the vast potential of the data held on a standardised computer system in primary care. The level of cooperation we received was encouraging. The collection of information was easy and demanded minimal effort from individual general practitioners. The method used data already held on each practice system rather than information which has been specifically targeted and entered, perhaps in

return for a "subsidised" computer system, as offered by some commercial companies.⁹

The main limitation on data interpretation is the degree of completeness and accuracy of the computer database. Most practices seemed to have all their patients on computer but some did not. This was mainly influenced by whether the individual practice had access to an automated download of basic patient registration details from their health board (13 out of 15 health boards in Scotland use this facility). Hence a minority of practices had to enter patients' basic registration details manually or may have chosen to do so only for certain patients—for example, those on repeat prescriptions. The incompleteness of the database may have led to some overestimation—for instance, in the number of practices reported to have 90-100% of patients with repeat prescription data (table I). Similarly, the lack of initial data from the health board may have led to certain types of important data, such as the community health index number, being absent.

In addition, the length of time a practice had been computerised would have affected its opportunity to enter data, as would its priorities on which values were entered into patients' records first. The amount of data on repeat prescriptions, clinical problems, screening, and recall information tends to increase with the time a practice has been computerised. Conversely, other information such as the community health index number, which may be present in the initial data downloaded from the health board computer but not used within the practice, tends to decrease after a time because of turnover of patients and the manual entry of new patient registration data. This has implications for the planned pivotal role of the community health index number in the coordination of screening activities in Scotland.⁸ There may be merit in agreeing with practices and health boards the importance of preserving such key information within practice computers to allow effective reconciliation of screening data between practice systems and primary care, family practitioner committee, and health board computers in the future.

The results reflect only the information available from the computer records, and clearly the use of the computer system varies greatly between practices. It is important to emphasise that most practices will have parallel or additional manual record systems. The results are thus likely to represent an underestimate of any measured activity in a practice. Only when it can

TABLE III—Patient data available on computer according to when practices started computerisation

	Computerisation before 1987 (No of practices 88)			Computerisation in 1987-8 (No of practices 66)		
	Mean (SD)	Max	Min	Mean (SD)	Max	Min
Total number of patients per practice*	7325 (4555)	23 406	137	5543 (3571)	13 182	18
No of patients per general practitioner	1432 (496)	2 373	46	1273 (601)	2 157	4
% Of patients with morbidity records	31 (26)	97	0	19 (27)	85	0
% Of patients with drug information	28 (19)	100	10	18 (19)	100	0
% Of patients with a community health index number	50 (44)	100	0	59 (46)	100	0
% Of women with cervical smear data	23 (16)	65	0	10 (13)	48	0
% Of patients with blood pressure data	12 (15)	64	0	7 (13)	52	0

*1 010 452 Patient records were examined.

TABLE IV—Patient data available on computer according to whether entry into the practice computer was automatic or manual

	Automatic computer entry (No of practices 93)			Manual computer entry (No of practices 61)		
	Mean (SD)	Max	Min	Mean (SD)	Max	Min
Total number of patients per practice*	7324 (4088)	21 833	1065	5399 (4239)	23 406	18
No of patients per general practitioner	1558 (396)	2 373	451	1066 (612)	2 111	4
% Of patients with morbidity records	21 (24)	91	0	34 (30)	97	0
% Of patients with drug information	17 (9)	35	0	33 (26)	100	0
% Of patients with a community health index number	84 (27)	100	0	8 (25)	100	0
% Of women with cervical smear data	16 (16)	54	0	20 (16)	65	0
% Of patients with blood pressure data	7 (12)	64	0	14 (17)	54	0

*1 010 452 Patient records were examined.

be established that entry of data for a specific topic is complete can a study of computer data be accurately representative of practice activity.

Each practice received a personalised report to enable its general practitioners to compare their own statistics with those obtained regionally and nationally. We hope that this will encourage advances and refinements in the role of the computer.

The study was well received, and many participating practices were keen to expand the information collected to include comparative data on the use of specific drugs, morbidity codes, and the study of specific groups of patients or particular diseases.

The future possibilities of this method are extensive. Simple development of the interrogation software will allow more detailed and sequential analyses of general practice data. Morbidity data can be analysed by age, sex, and area to provide national and regional epidemiological information. Repeat prescribing patterns can be studied by identifying the frequency of use of specific drugs, or groups of drugs, in relation to particular groups of patients or geographical areas. The ability to look specifically at repeat prescribing will complement the prescribing analysis and cost (PACT) information system, which cannot separately identify repeat prescriptions.¹⁰ Changes in prescribing habits can be monitored during changes in the health service, including the use of indicative drug budgets and practice formularies. Imminent expansion of the scope of GPASS software, to include opportunistic screening, consulting room modules, and the generation of practice reports, will allow the electronic questionnaire to extend into screening and administrative comparisons.

Amalgamation, analysis, and interpretation of data by a neutral university department can ensure confidentiality. Encouraging the cooperation of practitioners will allow relevant feedback both nationally and regionally. This method will allow practices to produce a regular epidemiological, clinical, and administrative snapshot of their practice activities throughout the year and enable statistics to be automatically generated for practice reports. Each quarter, half year, or year data can be amalgamated to produce an overview of the importance of activities based on

general practice in the provision of regional and national health care.

Conclusion

We believe that this exercise has demonstrated a simple method which can successfully use the data held on a standardised computer system (GPASS). The available database is now double that explored in this study, and the volume of data on prescribing, morbidity, screening, and recall factors will grow steadily as practices extend the use of their computers.

General practitioners seem keen to receive more detailed information about their use of the computer and this may help improve patient care. Many practitioners have continued to use the electronic questionnaire software to monitor regularly how computerisation in their practice is progressing. We intend to develop the electronic questionnaire and extend its scope to maximise the potential of the routine GPASS database in Scotland.

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ANY QUESTIONS

Is a vegan diet harmful for infants and children?

Vegans are total vegetarians who avoid all dairy products and eggs as well as meat, fish, and poultry. Vegan diets are not harmful for infants and children if practised with understanding of the nutritional needs of young children and if vitamin supplements and other nutritional supports such as soya infant formulas are accepted.¹ Many vegetable foods have low energy density and are high in fibre. Children need to consume large volumes of food to achieve energy requirements but fats and oils added to carbohydrate sources may increase energy density considerably.

Vegetable proteins commonly lack one or more essential amino acids but deficiencies can be overcome by mixing proteins at each meal to complement a protein deficient in one amino acid with a protein fairly rich in it. Mixing different cereals; mixing cereals, legumes, and dark green vegetables; and mixing soybean preparations with dark green vegetables all improve the quality of protein. Adequate energy intakes are essential to optimise amino acid utilisation.

Many vegetable foods are good sources of vitamins especially vitamin C. Riboflavin and vitamins B₁₂ and D are particularly likely to be deficient in vegetarian diets. Margarines and infant and breakfast cereals are supplemented with vitamin D, and exposure to summer sunlight diminishes the need for a dietary source of vitamin D. Dietary sources of riboflavin and vitamin B₁₂ are more of a problem. Mineral absorption from vegetable foods is often poor and may be facilitated by ascorbic acid. Calcium requirements are difficult to achieve without using infant formula. Thus soya infant formulas should be continued beyond infancy as

useful sources of protein, vitamins, and minerals, particularly calcium.

Vegan infants should be breast fed or fed soya based infant formula. Breast feeding mothers should seek advice on their own nutrition as maternal vitamin and mineral deficiencies (especially for vitamins B₁, riboflavin, B₁₂, and D) will be reflected in deficiencies in the milk. Weaning foods should be introduced gradually at between 4 and 6 months, but feeding some breast milk or soya infant formula should continue into the second year of life. Young children should be fed at least four times a day to reduce the difficulties of achieving adequate energy from a bulky diet. Each meal should contain energy sources that include margarines or oils, varied proteins, and a source of vitamin C—this facilitates absorption of iron in the reduced ferrous form.

A variety of fruits, vegetables, and cereals over the course of the day should provide sources of trace elements and most vitamins. All vegan infants and children should receive daily supplements that include vitamins A, C, and D and riboflavin (not present in the standard children's vitamin drops usually recommended for infants), as well as a monthly supplement or rich source of vitamin B₁₂. The adequacy of the vegan diet should be monitored by regular checks of weight and height against growth centiles and dietary advice sought for children who fail to thrive. The Vegan Society, 33-35 George Street, Oxford OX1 2AY, gives advice on how vegans can achieve nutritional adequacy with their diet.

Diets more restrictive than vegan diets—for example, fruitarian, macrobiotic, etc.—are not safe for children, if at all. —ELIZABETH POSKITT, senior lecturer in child health, Liverpool

- 1 Nutrition Standing Committee of the British Paediatric Association. Vegetarian weaning. *Arch Dis Child* 1988;63:1286-92.