

The Hospitals for Sick Children; Guy's; Northwick Park; Queen Elizabeth's, Hackney; the St Peter's Hospitals; University College; and the Whittington.

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Computer assisted shared care in hypertension

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Abstract

A computer assisted shared care scheme for the long term management and follow up of hypertensive patients has been developed in the Grampian Region. The scheme aims at facilitating the exchange of clinically important information between doctors and at achieving target levels of blood pressure with treatment in patients at highest risk of cardiovascular events.

The shared care scheme has been well received by the local practitioners. Two hundred and fifty seven patients (18%) of 1426 patients under current long term follow up are assigned to follow up in the hospital aspect of the scheme. At the most recent visit 32% of patients in the hospital aspect and 10% of 1169 patients in the general practice aspect had blood pressure recordings above the target levels of 160/95 mm Hg.

The stratification of patients formerly attending hospital clinics into grades of risk has rationalised our follow up procedures to allow the specialist resources to be freed and concentrated on those patients at highest risk and with the most complex problems. This computer assisted patient records system could be applied to other groups of high risk patients in whom long term follow up and surveillance are necessary—for example, patients with diabetes mellitus—and has implications for optimising and monitoring the delivery and outcome of care without overwhelming limited hospital resources.

Introduction

The control of blood pressure during treatment is an important predictor of the occurrence of cardiovascular events.^{1,2} An important problem in the care of hypertensive patients is that higher risk patients may be overlooked, inadequately treated, and ineffectively followed up among the mass of lower risk patients. Nevertheless, both groups need some form of long term surveillance.

We have developed a computer assisted patient record system whose principal aim is to improve and facilitate the transfer of clinically important information between doctors in hospital and general practice.³ We now report an extension of the patient record system to the long term shared care follow up of patients referred to our clinic for assessment of raised levels of blood pressure.

The scheme

The catchment area of the Aberdeen blood pressure clinic includes the population of the north east of Scotland, Orkney, and Shetland (about 500 000) and is served by over 250 principals in general practice. All patients who are referred to the clinic undergo assessment before they are entered in the computer assisted shared care scheme.⁴ They include patients with borderline or transient rises of blood pressure, with accelerated or refractory hypertension, or with renal, cardiovascular, and cerebral complications of hypertension, or adverse reactions to drug treatment.

Some 1631 patients have been registered since the start of the shared care scheme in 1980. There have been 64 deaths (4%). At present the cohort under follow up is 1426 patients. Some 18% (257 patients) are allocated to the hospital aspect of the scheme. The balance of patients are assigned to the general practice aspect (1169 patients), in clinical research studies (92 patients), have left the area (44 patients), or have been excluded from regular follow up because of repeated non-attendance (five patients).

A follow up appointment is scheduled in either the general practice or hospital aspect of the scheme depending on the severity of the rise of blood pressure, associated risk factors, concurrent diseases, or remote domicile.

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General practice aspect

Text edited letters are produced by the computer system for patients and practitioners for planned patient-practitioner follow up contacts. The letter to each patient invites him to attend at the practice surgery within one to four weeks of receipt of the letter, and to take all current medication to show to the practitioner. The letter to the practitioner invites him to amend and update a turnaround document—the “patient profile”—at the time of the patient-practitioner contact.

The patient profile is the “core” clinical document of the patient record system and is specific to each patient. The profile summarises clinically important information. It includes patient and practitioner identification data, a listing of active and inactive problems/diagnoses (with dates of onset), current medication (start date, name, dose, route, frequency, related problem number, and linked cautionary educational note⁷ if relevant), and information relevant to blood pressure follow up. Each patient profile is screened by a member of the hospital monitoring team before being sent out to the practitioner. Handwritten comment is made on important potential adverse drug-host or drug-drug interactions or on possible stepped care strategy if target blood pressures (see later) have not been attained previously.

After the patient-practitioner contact the updated patient profile is returned by the attending practitioner to the hospital team for auditing against the background of the problem orientated case notes⁸ held in the Aberdeen filing sequence.⁹ The reviewed patient profile is then passed to a secretary for updating of the database, production of a letter to the practitioner, and scheduling of the next follow up appointment in either the practice or hospital aspect of the scheme. The letters to the practitioner are selected from a menu of “standard” letters, which include additional educational content, or are free text in the instances of unsatisfactorily controlled blood pressure or identification of important new patient or drug factors. All letters to the practitioner include updated problem and drug listings specific to the patient. The new listings replace previous versions in the practitioner and hospital case notes.

Review of the outgoing and returning patient profiles (110-180/month; 0-4/practice), consideration of baseline information in the hospital case notes, selection of a standard text edited letter or dictation of a free text letter, and scheduling of a new follow up plan take one supervising doctor one to two minutes per patient or 30-90 minutes a week. The return of the patient profile is usually prompt. In many cases a helpful clinical comment on progress made by the patient has been added by the practitioner. A rotation of hospital monitor every two months introduces an alternative auditor to review and comment on the process and outcome of care in individual patients and to introduce new ideas to enhance the system.

Updating the information on the database, modifying the standard text edited letter, and entering the follow up plan takes one to two minutes per patient of secretarial time. If a free text letter is dictated (5-10% of letters) this takes only slightly longer because the patient and practitioner identification data, problem, and drug lists and much of the letter are displayed on the screen of the visual display unit and retyping of previously entered information is not required.

The cooperation of the practitioners has been outstanding and is vital to the smooth operation of the follow up scheme. Only one practitioner refused our invitation to participate at the outset, but is now participating. Misunderstandings about the objectives were reduced by consulting with practitioners before introducing the scheme and by inviting their participation. One anxiety among some practitioners was that the hospital aspect would seek to direct prescribing and follow up rather than to advise. The continuing exchange of profiles and letters about individual patients, as well as personal contacts, have helped to avoid misconceptions and to allow successful implementation of the shared care scheme. We encourage referral of newly diagnosed patients and of previously diagnosed patients with levels of blood pressure refractory to treatment. Several practices have organised hypertension screening programmes. Referrals have increased to 10-12 new patients per week. This pattern reflects an appreciation by practitioners that

patients will be returned to the practice aspect after assessment, with the added provision of a follow up system which incorporates continuing input of up to date information about the management of hypertension.

Inquiries are made in respect of patient profiles overdue for return from the practice aspect beyond a three month period (roughly 10%). These have invariably been answered most constructively by practitioners or by ancillary staff. The usual explanations for overdue returns include failure by a patient to attend due to a change of address, misfiling, oversight, or unfamiliarity among practice staff with the mechanics of the shared care scheme.

The continuing exchange of clinically important information among doctors has enabled the process and quality of care to be influenced in numerous patients. Examples include guidance to practitioners on potential drug-drug or drug-host interactions, on problems in blood pressure measurement technique such as the effect of the position of the arm or cuff size, or advances in the management of hypertension.⁸ Numerous examples of misunderstandings, non-compliance with a drug regimen, or default from follow up by the patient have been identified. The review of shared care documents has also served to broaden the clinical experience of the participants in both the hospital and general practice aspect of the scheme and to improve awareness of factors affecting the management of hypertension and the response to treatment.

Hospital aspect

The principal effects of the introduction of the shared care scheme have been a reduction in the number of patients under regular long term follow up at the hypertension clinic, a reduction in hospital clinics, an intensification of the attention paid to the highest risk patients, and a reduction in patient contacts with inexperienced hospital staff.

At the time of writing 257 patients (18%) of 1426 patients having long term shared care follow up are assigned to the hospital aspect of the scheme. The attendance at the hospital clinic averages 80 review patients per month. We allocate 15 minutes per patient and with four doctors in attendance this takes up to five hours or roughly two half day sessions a month. This is a halving of the former state of affairs and has avoided a topsy turvy growth of a large hypertension follow up clinic. The assessment of new referrals is kept separate from hospital follow up clinics.

Patients scheduled to attend the hospital clinic receive a computer generated appointment letter, and a request to bring all current medication to the clinic. As in the general practice aspect of the scheme, all patient profiles are screened before the clinic, updated at the time of the patient-doctor contact, and an appropriate standard or free text letter dictated to the practitioner. The patients who attend the review hospital clinic have either refractory hypertension, complex management problems, or are being assessed and reviewed before being transferred to the general practice aspect of the scheme. The review of data before and at the clinic, dictation of free text letters, and secretarial processes are very similar to those operating for the practice aspect of the scheme and are associated with similar time saving procedures.

Patients with satisfactory levels of blood pressure are transferred after assessment to the general practice aspect of follow up unless special factors are evident. These include chronic renal failure, polycystic renal disease, or novel or complex regimens. Most patients have welcomed transfer or entry to the general practice aspect of the scheme. They recognise that indefinite follow up at hospital clinics of an increasing number of patients with well controlled levels of blood pressure is illogical if an alternative system of supervised follow up in collaboration with the practitioner is available. Others have volunteered that they welcome the saving in time off work and reduced travelling and waiting time.

Analysis of the intervals between scheduled follow up contact shows that this ranges from one to 18 months, with a median of six monthly intervals for treated patients. The follow up condition of all patients registered in the scheme is known. A follow up link for

mortality data with the Office of Population Censuses and Surveys is maintained for all patients registered in the scheme.

Management policy

The hospital monitoring group meets regularly to consider policy in the light of developing trends in the treatment and investigation of hypertension. Exchange of profiles, correspondence, personal contacts, and meetings with general practitioners help to clarify and improve aspects of shared care management.

Our present policy is to seek to achieve an arbitrary "target" blood pressure for patients having treatment of below 160/95 mm Hg (phase 5, lying or sitting, arm supported at heart level). Appropriate allowances are made for age, other risk factors, and presence of complications. For example, lower targets are set for patients with polycystic renal disease or aortic aneurysm. In addition, patients of particular interest have been identified—for example, those with borderline hypertension, renovascular disease, accelerated hypertension, and patients treated with novel drugs. These cohorts will form the basis of separate reports.

Review of the most recent blood pressure management for patients when last seen in the shared care scheme showed that systolic and diastolic blood pressures of above 160 and 95 mm Hg respectively were evident in 10% of the 1169 patients in the general practice aspect of the scheme and in 32% of 257 patients currently allocated to hospital follow up. A detailed description of the quality of control of blood pressure achieved in the scheme will be presented elsewhere. Interestingly, of 66 patients in the patient record system with a recorded diagnosis of accelerated hypertension, 42 are currently in the general practice follow up group with satisfactory levels of treated blood pressure.

The control of blood pressure achieved within the scheme emphasises the problems of setting target blood pressure levels. Strict criteria are difficult to enforce because patient, doctor, and drug factors influence decisions to amend a therapeutic regimen or to recall a patient for an earlier appointment or to a different aspect of the scheme. Nevertheless, the proportion of patients with blood pressure levels above 160/95 mm Hg gives no grounds for complacency and shows that a more aggressive application of our stepped care treatment policy is required if we are to reduce cardiovascular events in patients having treatment.^{1,2}

Computer aspects

The present patient record system programs are written in Fortran using in house software for database management, screen handling, transaction update, and recovery on a CTL 8046 mini-computer.³ Interrogative programs provide listings of patients with any combination of data held on the patient record system.

A reimplementation of the patient record system in a Richard Pick operating system environment is now being undertaken in collaboration with Aberdeen University Computer Services Ltd, with funding from the Information Services Division, Common Services Agency, Scottish Health Service. This reimplementation will allow the patient record system to be available to new users outside Grampian Health Board on a range of minicomputers with a Pick operating system. It would be unsatisfactory for potential new users to be restricted to non-supported in house software which was available only on CTL hardware. We expect that our group will support the new system and that the software will be available free within the Health Service. The next stage of development will be to implement the patient record system, again in the Pick environment, on microcomputers.

Other applications

The application of a shared care scheme to concentrate specialist resources on the highest risk patients, rationalise hospital outpatient follow up, and monitor the process and outcome of care for the

whole group at risk has implications beyond the management of patients with hypertension. The successful development of the shared care principle to a group of patients having treatment with penicillamine for rheumatoid arthritis (Eastmond, Robb, and Petrie, unpublished) and the imminent introduction of the patient record system to the follow up of selected patients with chronic renal disease (544 patients are registered on patient record system to date) are further signs of the local interest in such an approach. The patient record system has also been introduced to aid the management of outpatients attending a general medicine clinic, an asthma clinic (468 patients registered), and a diabetic clinic (2463 patients registered). A project in a local practice on anticipatory care of 1584 elderly patients is also in progress. Implementation of the principle of computer assisted shared care extension of the patient record system has not been introduced to these specialties to date.

Successful reimplementation of the patient record system in a Richard Pick environment will permit extension beyond Grampian of the approach of defining clinically important information about patients at risk. Furthermore, computers may be used to help monitor the process and outcome of care in follow up schemes involving acute and primary care services while optimising the use of limited health service resources.

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A man of 70 had a coronary infarct at 65 and now has mild angina of effort. He also suffers from migraine. What treatment is advised?

The questioner has in mind that all the drugs currently recommended for the treatment of angina are vasoactive and might influence migraine. Changes in intracerebral and extracerebral flow associated with migraine are complex: recent work suggests that the headache phase is associated with a reduction in blood flow rather than an increase.¹ Knowledge of the influence of vasoactive drugs on symptoms remains mainly empirical. Nevertheless, I have the impression that nitrates are more likely to precipitate severe headache in patients with migraine than in those not so afflicted, but I know of no firm evidence for this. Indeed, glyceryl trinitrate found one of its first medical roles in the treatment of migraine.² The lipophilic beta blockers, such as propranolol, are sometimes used for the treatment of migraine, and even calcium channel blockers are undergoing clinical trial. Thus a tendency to migraine should influence treatment of angina very little. If beta blockers are to be prescribed then propranolol may be the drug of choice, and nitrates should be started only at cautious doses. At this age and with a history of infarction, the angina is unlikely to be dominantly vasospastic despite the associated vasomotor headache, so calcium channel blockers have no specific role but are not specifically contraindicated. Finally, it is worth emphasising that preparations containing ergot should not be used for the treatment of migraine in the presence of angina.—D CHAMBERLAIN, consultant cardiologist, Brighton.

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