Initial care of hypertensive patients

Influence of different types of clinical records

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The initial record of history and clinical findings has been studied in 278 patients attending three hypertension clinics. Half of these were randomly allocated to standard case notes and the other half to a special structured questionnaire record. The investigations carried out in a total of 521 patients with raised arterial pressures were examined.

The records derived from the structured questionnaire were much more complete than the standard case notes but the difference was less obvious for a positive record than a negative one. None of the investigations was carried out in all patients, even though it was the policy of the clinics that most of them should be. A possible aetiological diagnosis was made in 28 patients and, at the time of writing, 3 patients had benefited from a surgical operation carried out as a result of investigation. These results raise the question of the quality of the initial care of hypertensive patients and suggest that the structured questionnaires might lead to an improvement. It remains to be established whether all the information collected does influence the outcome in patients with hypertension.

High arterial pressure is one of the few chronic conditions that is amenable to long-term medical treatment (Veterans Administration Co-operative Study 1967, 1970). It is fairly widely agreed what historical and clinical features and investigations are necessary information for the proper management of patients with high blood pressure. A previously published paper by Frohlich and his associates (1971) showed that the recording of these initial features was very incomplete in a group of hospitals in Oklahoma City including the University Hospital. The present study was undertaken as part of a larger one to improve record keeping and patient care in the hypertension clinics of three hospitals. It has provided the opportunity to carry out a controlled trial of the effect of different types of record system on the collection of clinical information and to consider the value of the information derived from investigations.

Methods

Hypertension clinics at three University hospitals, the Radcliffe Infirmary in Oxford, and Hammer-

smith, and King's College Hospitals in London, co-operated in the present study. Each was allocated a quota of patients to be included in the study and during the period of recruitment all newly referred hypertensive patients were admitted to it. They were allocated by randomisation either to standard hospital charts or to a structured questionnaire. A description of the questionnaire has been published (Beilin *et al.*, 1974) as have some of the details of the trial (Bulpitt *et al.*, 1976). The number of patients and some clinical details of them are shown in Table 1.

The identity of the patients allocated to standard hospital records was recorded at the time of randomisation, but no further action was taken concerning them until a year later when the charts were drawn from the file and all the information in them concerning clinical history, family history, social history, and clinical signs and investigations was abstracted and coded. The study forms part of a larger one in which the use of a computer-based clinical record is compared with standard charts (Bulpitt *et al.*, 1976). However, the intervention of the computer is not relevant to the present comparison which is based solely upon the initial evaluation.

Received for publication 22 July 1976

Table 1 Allocation of patients to standard records and structured questionnaire

	Standard records 142	Structured questionnaire 136
Pulse rate beats/min	83.4	82.1
Lying diastolic blood pressure (mmHg)	106.4	105.2
Lying systolic blood pressure (mmHg)	177.4	177.8

The results in the case records were punched on to paper tape and analysed on an ICL 1903 computer (Coles *et al.*, 1976). For the present analysis a count was made of the number of charts containing a positive record of a particular feature, the number having a negative record, and the number of case records containing no record at all of that feature.

A proportion of the patients admitted to the trial turned out to have near normal blood pressure when they were seen at hospital. Detailed investigation of them may not have been appropriate and we have evaluated the investigations carried out in a larger sample of 521 patients for whom clinical information was recorded on the structured questionnaire and whose systolic pressure exceeded 140 mmHg and whose diastolic pressure was equal to or greater than 95 mmHg without treatment. In this part of the investigation a further search of laboratory records was made to try to ascertain the results of investigations recorded as ordered but where no results had been entered. To facilitate comparison, the data from our study have been classified using the same headings as those used in an earlier investigation in Oklahoma City (Frohlich *et al.*, 1971).

Results

HISTORY

The computer record derived from the structured questionnaire gave by far the most complete history

of crucial features in hypertensive patients. An entry was present for each feature in nearly 100 per cent of the patients. The standard notes of the three participating clinics were less complete; on average 65.9 per cent of the items had a record of the feature concerned. The Oklahoma City records had an entry on an average of 31.9 per cent of these features, but these clinics were not specialist hypertension clinics (Table 2).

Positive features were recorded more frequently in the structured questionnaire (average 22.4%) than in the standard case notes (average 18.5%). The difference between the two systems was less for positive records than for the presence of any record. This suggests that information is more likely to be written down if it is positive than if it is negative.

Clinical signs

A record of key clinical signs was present in a higher proportion of the structured questionnaire records than the standard ones (77.5% and 62.7% respectively). It is noteworthy that though the records from the structured questionnaire were much more complete for the examination of the femoral pulses and abdominal bruits, none of the patients allocated to this type of record had any abnormality of these clinical signs detected (Table 3). This raises the question of what rate of significant abnormalities is required for a particular part of the clinical examination to be retained as a routine.

Investigations

The analysis of investigations done was derived from a larger sample than the data on history and clinical signs. None of the investigations had been carried out in all the patients. The highest proportion was 94.4 per cent for electrocardiogram.

Tests for phaeochromocytoma (45.7%), a urine culture (64.7%), and an intravenous pyelogram (67%) were done less often. These figures are disconcerting as it was policy in two of the three

Table 2 History

	Computer record*		Standard record*		Oklahoma City study
	Present	Positive	Present	Positive	
Family history of hypertension	86.8	28.7	62.0	21.8	28
Statement on CNS symptoms	100.0	37.5	58.5	18.3	24
History of angina pectoris	99.3	10.3	77.5	7.7	63
History of exertional dyspnoea	99.3	37.5	83.8	30.3	43
History of oedema	97.8	19.1	46.5	10.6	38
Statement on other cardiovascular symptoms	99.3	2.9	38.0	1.4	23
Statement on genitourinary symptoms	100.0	43.4	86.6	38.7	31
History of dysuria	100.0	9.6	79.6	7.0	25
History of haematuria	99.3	2.2	54.2	4.9	19
History of nocturia	99.3	39.7	72.5	34.5	25

*Percentage of all records with any comment present and with a positive statement made.

Table 3 Clinical signs

	Computer record*		Standard record*		Oklahoma City study
	Present	Abnormal	Present	Abnormal	Present
Description of optic fundi	98.5	71.3	94.4	55.6	65
Description of neck veins	97.1	2.9	81.0	1.4	20
Description of lung findings	96.3	6.6	91.5	7.7	89
Description of thyroid size	0.7	0.7	9.9	2.8	63
Description of cervical bruit	94.9	0.7	30.3	0.7	20
Estimate of cardiac size	81.6	0.0	66.9	0.0	69
Presence of extra heart sounds	98.5	6.6	88.7	7.7	9
Note on cardiac rate	91.9	—	76.8	—	75
Note on cardiac rhythm	91.9	—	78.2	—	77
Ankle oedema	99.3	2.2	42.2	3.5	58
Femoral pulse	100.0	0.0	67.6	0.0	9
Abdominal bruit	75	0.0	35.2	0.7	14

*Percentage of all records with any comment present and an abnormality detected.

Table 4 Investigations

Investigations	Computer record*	Oklahoma city*
Urine analysis	93.1	96
Complete blood count	33.0	99
Blood glucose	69.5	17
Plasma sodium	91.2	51
Plasma potassium	91.0	51
Plasma urea	92.7	—
Chest radiograph	87.3	86
Electrocardiogram	94.4	88
Test for phaeochromocytoma	45.7	11
Urine culture	64.7	20
Intravenous pyelogram	67.0	34
Renal arteriogram	0.8	6

*Percentage of cases in which each investigation was carried out.

clinics that these tests should be done in all new referrals (Table 4).

The low figure for complete blood count must be interpreted with caution for 78.3 per cent of patients had a haemoglobin estimation without a full blood count.

The cost and inconvenience of investigation in hypertensive patients can only be justified if there is a yield of positive information that leads to improvements in patient care. In terms of aetiological factors the results of investigating 521 patients shown in Table 5. Five patients were thought to have a renal artery stenosis on the basis of the

Table 5 Possible aetiological diagnoses in 521 hypertensive patients

Phaeochromocytoma	1
Renal artery stenosis	3
Polycystic kidneys	2
Retroperitoneal fibrosis	1
Renal papillary necrosis	1
Chronic pyelonephritis	16
Cushing's syndrome	1
Acromegaly	1
Primary hyperparathyroidism	1
Disseminated lupus erythematosus	1

intravenous urogram but this was disproved in two by renal angiography. Of the three in whom the diagnosis was confirmed, one is awaiting surgery, one had extensive irradiation of para-aortic lymph nodes for a seminoma and eventually died of volvulus and intestinal obstruction, and the third had extensive atheromatous disease and was not considered suitable for surgery. One patient who presented with hypercalcaemia and renal stones had a parathyroidectomy to avoid further renal damage; his mild hypertension was controlled by diuretics and was not the main problem.

Twelve patients had a significant growth of pathogens in a urine culture (Table 6). Though a positive culture was 3.4 times as common in patients who gave a history of dysuria, two-thirds of the positive tests were in patients without a history of dysuria. Treatment of these infections did not affect the blood pressure and it is not possible to say whether it may have influenced the long-term prospects for renal function.

The blood urea was less than 40 mg/100 ml (6.64 mmol/l) in 372 patients, between 40 and 60 mg/100 ml (6.64 and 9.96 mmol/l) in 105, and over 60 mg/100 ml (9.96 mmol/l) in 30 patients. Knowledge of the raised blood urea in these 30 patients was thought to have altered management in that it influenced the choice of drug, the decision about other investigations, and advice about prognosis.

Other diagnoses were made in the patients, e.g.

Table 6 Result of urine culture in 379 hypertensive patients

	No dysuria	Dysuria	Total
Urine culture negative	320	47	367
Urine culture positive	8	4	12
Total	328	51	379
Percentage positive	2.5%	8.5%	3.3%

11 patients were found to have small renal calculi on the IVU but though these affected management they did not lead to procedures that might have cured the hypertension.

Discussion

This study raises two important questions. The first concerns the quality of initial care of hypertensive patients and asks why many of the patients attending these specialist clinics had an incomplete record of features that most doctors would regard as important. Specialist hypertension clinics should obtain a more complete record than general medical clinics such as those studied in Oklahoma City. Few of the items obtained a 100 per cent score, though the structured questionnaire was close to it on most of the historical items and many of the clinical features. Obviously a well-designed questionnaire is a better way of obtaining a complete record than relying on the physician's recall of a similar series of questions in his mind. However, the questionnaire was not infallible and recording fell to 75 or 80 per cent for items such as heart size and abdominal bruit despite provision of a pre-printed box for the information to be entered. The incomplete investigation of the patients is also somewhat disturbing. Why had less than 100 per cent of patients had an electrocardiogram or a plasma potassium estimation? There are probably many reasons: some tests may have been done but the results lost, samples may have gone astray, patients failed to attend for investigations, or doctors forgot to order them. Achievement of a complete record evidently requires constant checking that results of investigations have been entered. One advantage of a computer-based system is that such checking can be done relatively easily. It is of interest that the VMA was measured in only just under half of the patients; this investigation was not preprinted on the check list at the end of the structured questionnaire, whereas all the others were.

Use of a structured questionnaire for a specific disease entity such as hypertension is most practicable in a specialist environment where the diagnosis has already been correctly made in the majority of patients before they are given appointments. Thus, our system in its present form is appropriate to a hypertension clinic but may be difficult to implement in a general medical clinic or family practice, though one general practitioner has entered over 100 patients on the system.

The second question is whether it made any difference to management whether the information was collected or not. Would the quality of care have been better if every item had scored 100 per cent?

Might a better system just lead to more unnecessary intravenous pyelograms being carried out? Judged purely on the yield of positive information, the history seems to be the most fruitful source of abnormal findings while the clinical examination gave much less positive information in these patients, most of whom had slightly raised blood pressure.

Could most of the clinical examination and investigations be discarded? Many have questioned the value of the routine intravenous pyelogram in hypertensive patients, and we have been engaged with other colleagues in an attempt to redefine the selection criteria in order to reduce the number greatly and improve the proportion of positive tests (Lewis *et al.*, 1976). It is a difficult question to decide what yield of positive information differentiates between a worth-while test and one that ought to be discarded. To the individual patient who has a pheochromocytoma it is a life-and-death matter that it should be detected and removed. But the hundreds of patients who collect negative 24-hour urine samples and those who pay for them might well have a different view. To investigate this question poses difficulties, but it is inevitable that those who define quality by studying the process of medical care must ultimately be asked to justify the cost effectiveness of individual components that they judge to make up optimal health care of a particular condition.

We are at present using a simpler structured questionnaire which is intended for use in family practice. It is our intention then to examine in hospital the effects upon patient care of using this in place of the present one.

This research was begun with the aid of a grant from the Nuffield Provincial Hospitals Trust and has been continued with a research grant from the Department of Health and Social Security. We are grateful to the many colleagues in the Hypertension Clinics of the participating hospitals who have taken part in the collection of the clinical information.

References

- Beilin, L. J., Bulpitt, C. J., Coles, E. C., Dollery, C. T., Johnson, B. F., Mearns, C., Munro-Faure, A. D., and Turner, S. C. (1974). Computer-based hypertension clinical records: a co-operative study. *British Medical Journal*, 2, 212.
- Bulpitt, C. J., Beilin, L. J., Coles, E. C., Dollery, C. T., Johnson, B. F., Munro-Faure, A. D., and Turner, S. C. (1976). Randomised controlled trial of computer-held medical records in hypertensive patients. *British Medical Journal*, 1, 677.

- Coles, E. C., Beilin, L. J., Bulpitt, C. J., Dollery, C. T., Johnson, B. F., Munro-Faure, A. D., and Turner, S. C. (1976). An approach to computer processing of clinical data. *The Computer Journal*, **19**, 104.
- Frohlich, E. D., Emmott, C., Hammarsten, J. E., Linehan, W. M., Pollack, D., and Horsley, A. W. (1971). Evaluation of the initial care of hypertensive patients. *Journal of the American Medical Association*, **218**, 1036.
- Lewis, P. J., Bulpitt, C. J., Sherwood, T., and Dollery, C. T. (1976). Routine intravenous urography in the investigation of hypertension. *Journal of Chronic Diseases*. In the press.
- Veterans' Administration Co-operative Study (1967). Effects of treatment on morbidity in hypertension. Results in patients with diastolic blood pressures averaging 115 through 129 mmHg. *Journal of the American Medical Association*, **202**, 1028.
- Veterans' Administration Co-operative Study (1970). Co-operative study group on anti-hypertensive agents. Effects of treatment on morbidity in hypertension. Results in patients with diastolic blood pressure averaging 90 through 114 mmHg. *Journal of the American Medical Association*, **213**, 1143.

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