

The management of hypertension in the elderly by general practitioners in Merseyside: the rule of halves revisited

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SUMMARY

Background. Treatment of hypertension in the elderly significantly reduces cardiovascular events and confers greater absolute benefit compared with treating younger adults. However, this group has been undertreated in the past.

Aim. To perform a reliable and valid multipractice audit of the current management of elderly hypertensive patients.

Method. An observational study conducted as multiple standardized audits in general practices. The notes of 6139 patients aged 65 years or over from 76 general practices in Merseyside were examined to determine the percentage of elderly patients who had their blood pressure recorded. The percentages of hypertensive patients who were diagnosed, treated, and controlled was also recorded.

Results. Eighty-one per cent of the sample had their blood pressure recorded. Fifty-three per cent of patients over the age of 65 were identified as hypertensive; 64% of hypertensive patients are receiving antihypertensive medication and 54% of treated hypertensive patients can be considered controlled. However, very small changes in the criteria used to define blood pressure control have dramatic effects on the results. Digit preference and the number of available blood pressure recordings also significantly affect the results.

Conclusion. The management of hypertension in the elderly by Merseyside general practitioners (GPs) gives better results than predicted by the 'rule of halves'. Elderly hypertensive patients are more likely to be detected and treated, but only half achieve control to 160/90. The results are particularly sensitive to the degree of digit preference, the number of available recordings, and to the precise definition used for control.

Keywords: hypertension; Merseyside; elderly; audit.

Introduction

RECENT trials have illustrated that treating hypertension in elderly subjects reduces the rate of cerebrovascular accidents and is of greater absolute benefit than in younger patients.¹ There is evidence that hypertension is not well managed in this population^{2,3} and that the rule of halves⁴⁻⁶ still applies (i.e. that only half

of hypertensive patients have their blood pressure measured, half of those identified are treated, and only half of those treated are controlled). Improved control of hypertension will be a key factor in achieving reduction in mortality from cerebrovascular accidents.

Doctors may remain reluctant to manage older hypertensive patients aggressively because of confusion over the appropriate level of hypertension at which to initiate treatment, the appropriate level of control to be achieved, uncertainty of the hazards of isolated systolic hypertension, and fear of adverse effects of treatment.⁷

Audit of hypertension management in the community is sometimes claimed to be simple,⁸ yet such audits are more complex than apparent at first.² Much of this complexity lies in the absence of a uniformly accepted and easily applicable definition of hypertension. A recent study⁹ illustrates how the diversity of existing guidelines can influence the results of such audits. Published audits have demonstrated considerable variation in their reported frequency of hypertension, treatment, and control.¹⁰ However, different definitions of hypertension and control have been used, impeding the direct comparison of different studies.^{11,12} Also, audits of hypertension are hindered by their failure to consider factors such as digit preference^{13,14} and the limited number of available recordings. Furthermore, considering hypertension alone without the assessment of other risk factors may be unsatisfactory.⁹

We investigated the current diagnosis, treatment, and control of blood pressure in an elderly population in a multipractice audit using a standardized approach established by a previous study (M Cranney, S Barton, and T. Walley, Auditing the management of hypertension in British general practice: a critical literature review, unpublished ms). We explored how various factors influence the results of an audit of the management of hypertension in the elderly.

Method

We conducted a cross-sectional observational study of the recorded management of hypertension between September 1990 and August 1995 in a sample of elderly Merseyside patients. From the 308 practices in four family health services authority areas, 103 were selected randomly and invited to conduct a standardized practice audit, with the help of audit assistants trained and funded by the researchers. The anonymized results of each audit, including individual patient data but without identifiers, were released by the practices to form a central database.

The audit was designed to select every 10th patient from a list of all patients aged 65 or over who were registered with the practice on 1 September 1995. Their records, including handwritten notes, hospital letters, and computer files, were examined by the audit assistants. The most recent blood pressure readings (up to a maximum of three), cardiovascular drug therapy and its stated indication, and any diagnosis of hypertension were recorded.

The criteria used to identify hypertensive patients and patients with controlled blood pressure are shown in Box 1. Following the conservative approach taken by Fahey and Lancaster¹⁵ for the

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© British Journal of General Practice, 1998, 48, 1146-1150.

purposes of assessing the control of blood pressure, we included only those recordings taken after the most recent change in any antihypertensive medication. Some patients changed their antihypertensive treatment in the study period, and not all had recordings after this change.

The apparent management of hypertension in a population may be affected because patients are grouped into practices, with patients in any one practice managed differently from patients in other practices.^{9,16,17} To assess any clustering bias, we estimated the population parameters with and without weighting of each practice's results by the number of patients aged over 65 years at that practice. The difference produced by weighting was small for all parameters (never more than 3.7% of the corrected proportion), and so only unweighted results are presented. The median and interquartile range of the proportion for each individual practice were calculated and are presented together with the mean for the whole sample.

Statistical analyses were performed using the Stastical Package for the Social Sciences (SPSS).

Results

Seventy-six practices agreed to participate in the study, and the audit assistants examined the notes of 6139 people (median age was 73 years, interquartile range 69 to 78 years; 58% female).

Hypertensive patients are those meeting at least one of the following criteria:

Criterion 1: explicitly diagnosed hypertension

People with clearly labelled notes also receiving antihypertensive drugs (patients labelled but not receiving drugs were not considered hypertensive)

Criterion 2: high blood pressure record

Systolic mean or diastolic mean pressure at or above critical levels

Blood pressure control was defined as systolic mean and diastolic mean pressure below critical levels in hypertensive patients on antihypertensive drugs. Blood pressure readings were restricted to those measured since the last change in antihypertensive medication

Box 1. Definition of hypertension and control of blood pressure.

Practices included in the study did not exhibit statistically significant differences from practices in the catchment area in any of the following characteristics: age and sex distribution; mean list size; the percentage of single-handed practices; the percentage of training practices; and the percentage of fundholders. There was a non-significant tendency for training and fundholding practices to be included in the sample.

A total of 4946 patients had a blood pressure recording in their notes [population mean was 80.6%; median practice value was 86%; interquartile range of practice values (IQR) 77% to 90%]. In all, 11 441 blood pressure recordings were noted by the audit assistants and were used within the audit to assess the prevalence of hypertension.

The two criteria for hypertension each identified similar numbers of hypertensive patients (Table 1). By applying both criteria, 42.5% of patients were identified as hypertensive. For those patients with a blood pressure recording in the notes, relatively more patients were identified as hypertensive (mean = 52.1%; median = 51%; IQR = 45% to 58%).

There is marked digit preference, with 86% of all systolic pressures and 77% of all diastolic pressures ending in zero. The combinations of systolic and diastolic blood pressure recordings were sharply limited by this, with 47% of all recordings accounted for by only 11 combinations (e.g. '140/80' accounted for 7.8% of all recordings). This tendency did not change appreciably between 1990 and 1995.

The number of blood pressure recordings in the notes of each patient has a marked effect on the results of the audit. This is most evident in the assessment of the percentage of hypertensive patients currently being treated with antihypertensive medication: 30% for those with one recording compared with 80% in the group with three recordings (Table 1). Overall, 64% of hypertensive patients received antihypertensive drugs (median = 66%; IQR = 57% to 76%). The mean systolic pressures were higher in the patients with three recordings; these patients were more likely to be labelled hypertensive, to be on antihypertensive therapy, and to be over 75 years of age.

Fifty-six per cent of all patients on antihypertensive drugs had their treatment changed during the study period, and 29% did so in the year before the audit. Therefore, after applying the inclusion criterion from the Method section, only 1324 patients provided the 3002 eligible recordings that could be used to assess control.

Table 1. The effect on the results of different total numbers of blood pressure (BP) records per patient.

Number of BP records per patient	0	1	2	3	1-3	0-3
(A) Characteristics of each group						
Number of patients with that number of readings	1193	1233	931	2782	4946	6139
Mean of the mean BP for each patient	—	146.7/82.6	147.2/82.9	150.9/83.8	149.2/83.3	—
Standard deviation of the mean BP for each patient	—	20.2/9.6	18.2/8.7	16.6/7.5	18.3/8.5	—
Number on antihypertensive drugs for any reason	144	289	317	1035	2297	2441
Number (%) of patients aged 75 years or over	451 (38%)	503 (41%)	385 (41%)	1250 (45%)	2138 (43%)	2589 (42%)
*B) Patients with hypertension						
Identified by criterion 1	31	76	136	1029	1241	1272
Percentage of all patients	2.6%	6.2%	14.6%	37.0%	25.1%	20.7%
Identified by criterion 2, but not by criterion 1	0	509	268	561	1338	1338
Percentage of all patients	0.0%	41.3%	28.8%	20.2%	27.1%	21.8%
Identified by at least one of the two criteria	31	585	404	1590	2579	2610
Percentage of all patients	2.6%	47.4%	43.4%	57.2%	52.1%	42.5%
(C) Hypertensive patients on treatment						
Hypertensive patients on antihypertensive medication for any reason	31	178	204	1268	1650	1681
Percentage of hypertensive patients	100%	30.4%	50.5%	79.7%	64.0%	64.4%

Table 2 demonstrates the combined effect of digit preference and number of blood pressure recordings on the assessment of control. The significant influence of digit preference is shown by altering the criteria for blood pressure control from <160 and <90 (i.e. 160/90 is considered uncontrolled) to ≤ 160 and ≤ 90 (i.e. 160/90 is considered controlled). The effect was greatest for those with only a single blood pressure record, with the proportion of treated hypertensive patients who were classified as controlled more than doubling (26% versus 62%). This effect decreased with an increased number of available recordings per patient. Overall, 37% of patients with an available blood pressure recording were controlled to <160 systolic and <90 diastolic (median = 37%; IQR = 25% to 50%), and 54% were controlled to ≤ 160 systolic and ≤ 90 diastolic (median = 54%; IQR = 42% to 67%).

Assuming that our sample was representative and that 81% of all hypertensive patients had their blood pressure measured, we have included a comparison of our results with the traditional rule of halves (Table 3), using the alternative values for control demonstrated in Table 2.

Discussion

This study is the largest reported audit of hypertension management of the elderly in United Kingdom (UK) general practice. One important finding is that hypertension in this group seems to be better managed than predicted by the 'rule of halves'. Eighty-one per cent of our random sample had their blood pressure measured and, considering the size of our sample, it is likely that 81% of 'true' hypertensive patients in this population had their blood pressure recorded.

All audits of medical records are subject to the severe limitation that, as observational studies, they can only make use of the available data. For example, there is often no means of testing the accuracy of the label of hypertension found in some notes. A proportion of the diagnoses will be erroneous, and some patients may have been successfully withdrawn from unnecessary anti-hypertensive medication.¹⁸ We therefore adopted a conservative approach, as have others,¹⁵ by setting criterion 1 to exclude patients labelled as hypertensive but not currently on treatment.

Guidelines stress the need to base judgements about the diag-

nosis and control of hypertension on many recordings taken over a period.^{19,20} However, when interpreting an audit, the desired number of recordings are frequently not available, sometimes simply because they have not been taken during the study period, but also because frequent medication changes reduce the number of recordings available to estimate control.²¹ To restrict the analysis to patients with three records introduces a significant bias, as these patients are not typical (being more likely to be elderly, labelled hypertensive, and on treatment). To use fewer recordings introduces two different biases. The first difficulty is that single recordings vary more than the means of two or three recordings. As a result, more patients appear to be hypertensive when judged against a fixed blood pressure threshold. This effect is evident in Table 1B, in which it can be seen that the proportion of patients at or above a threshold (criterion 2) falls from 41.3% to 20.2% as the number of records used to form the mean increases.

The second difficulty stems from the digit preference in the recording of blood pressure,^{13,14,22} which has a profound impact when only single recordings are available to assess control (Table 2). We found that most recordings end in zero, so that effectively the unit of measuring blood pressure was 10 mmHg. This is in stark contrast to an earlier survey of attitudes among GPs, who claimed to record blood pressure to the nearest 2 mmHg.²³ This has an important message for everyday clinical practice: digit preference places a severe limitation on the ability to identify true mild hypertensive patients, even when using a moderate number of recordings, and may well lead to patients being treated unnecessarily.

It is not clear how GPs achieve digit preference, that is whether they round up, round down, round to the nearest decade, or even if they use a figure such as 160/90 as a label for a dichotomous variable, hypertensive or not hypertensive. The influence of digit preference may explain the startling effect upon the assessment of control; by simply changing the definition of control from <160/90 to 160/90, the proportion of hypertensive patients achieving control changes from 19% to 28% (see Table 3). This area would be a suitable subject for further work.

How GPs should audit their own performance depends on the purpose of the audit. As a guide to one's changing performance, consistent use of any reasonable criteria is appropriate. Other authors maintain that such an audit can be performed effectively

Table 2. Audit results showing the effect on the estimates of control of different numbers of blood pressure (BP) records per treated hypertensive patient.

BP records after the last change in medication	0	1	2	3	1-3	0-3
Hypertensive patients on antihypertensive medication for any reason	357	367	236	721	1324	1681
Blood pressure controlled <160 and <90	—	94	91	302	487	—
Percentage of treated hypertensive patients	—	25.6%	38.6%	41.9%	36.8%	—
Blood pressure controlled ≤ 160 and ≤ 90	—	227	125	368	720	—
Percentage of treated hypertensive patients	—	61.9%	53.0%	51.0%	54.4%	—

Table 3. Comparison of results with 'the rule of halves'.

Rule of halves		This audit	
		Control <160/90 mmHg	Control $\leq 160/90$ mmHg
50%	BP measurement in last five years	81%	81%
x 50%	Hypertensive patients on therapy	x 64%	x 64%
x 50%	Treated hypertensive patients with controlled BP	x 37%	x 54%
= 12.5%	Proportion of hypertensive patients achieving control	= 19%	= 28%

and reliably.²⁴ However, the biases considered in this paper become important when comparing differences in management between groups, and may explain some of the variation in the reported frequencies of hypertension awareness, treatment, and control noted in a recent review of different population studies.¹⁰ To prevent such biases from occurring, a uniform approach is required when reporting such audits for the purpose of education and research. In our current study, we have therefore attempted to examine all of the key areas expected in an audit of this type comprehensively.

Does the 'rule of halves' still apply? Table 3 shows that the proportion of hypertensive patients with a blood pressure recording, who are on treatment and achieve control, is substantially higher (28%) than predicted by the 'rule of halves' (12.5%). Even using conservative criteria, without correction for the small number effect and counting all those with a mean pressure of 160/90 as uncontrolled, the result is still better than the 'rule of halves' (19%). The 'rule of halves', therefore, does not describe the management of hypertension in the elderly of Merseyside; the difference is largely attributable to increased measurement and readiness to treat.

Our results contrast with a recent survey.⁶ Some of the discrepancy may be attributable to the different methods used in audits and in surveys; for example, some patients asked in surveys may not be aware that they are being treated for hypertension. Fahey and Lancaster¹⁵ used similar criteria to those used in this study and found comparable results; in their study, for example, 77% had at least one blood pressure record in the previous five years and 42% of those labelled as hypertensive were adequately controlled.

The use of a threshold in an audit oversimplifies the concept of control. A practice achieving mean pressures in all patients just above the threshold would perform badly in such an audit, perhaps despite having substantially reduced the residual risk of stroke and myocardial infarction in their patients: future audits may aim to quantify residual, avoidable cardiovascular risk. We deliberately chose not to incorporate other risk factors in this audit, in part for simplicity, but also because in the elderly an audit of blood pressure alone remains a valuable method of assessing cardiovascular risk,²⁵ and because of the incompleteness of recording of other risk factors.²⁶⁻²⁸ Furthermore, there is little evidence about the beneficial effects of modifying certain other risk factors in this age group.²⁹ It is important to note that the influence of digit preference and the small number of available blood pressure recordings will impact just as greatly on the calculation of absolute cardiovascular risk as it does on simpler audits of blood pressure control.

Even if no longer accurately described by the 'rule of halves', treatment of hypertension in the elderly still seems inadequate. There is a need both to increase our readiness to treat the elderly and to control blood pressure more frequently to 160/90^{30,31} or even to 150/90.³² The standardized audit used in this study will enhance educational strategies by allowing valid comparison with similar audits^{11,33} and by focusing attention on the problems of digit preference and the frequent paucity of blood pressure recordings.

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Acknowledgements

We would like to thank the practices for their enthusiastic participation. This project was funded by the Northwest Regional Health Authority. The authors have no vested interests.

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