

# Auditing the management of hypertension in British general practice: a critical literature review

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## SUMMARY

*Hypertension is a common condition almost exclusively managed by general practitioners (GPs), making it an ideal subject for practice-based audit. However, the conduct and interpretation of such audits is complex. Even minor variations in methodology can produce dramatic differences in results obtained. We used a focus group of seven GPs with a special interest in audit to establish a standardized method for the planning and reporting of audits for the management of hypertension. In order to enhance the reliability and comparability of hypertension audits, 13 key areas of audit methodology were produced by the focus group. Eleven audits were identified in a literature search using pre-determined selection criteria. These were then assessed to compare their methodology with the criteria produced by the focus group. None of the recently published audits in this subject covered all of the key areas (range: 27–65% of the areas covered). One key area, that of digit preference, was not mentioned by any. Other problematic key areas included the selection of patient records without bias, the determination of the prevalence of hypertension, the number of recordings used to determine the diagnosis of hypertension and its subsequent control, the time period examined by the audit, and the approach taken to notes containing an inadequate number of blood pressure recordings. Significant variability in the methods used by different authors in these key areas calls into question the reliability of their results and makes comparisons between them very difficult. We propose a standardized method for hypertension audits comprising 13 key areas, which will enhance the reliability of results and facilitate such comparisons.*

*Keywords: hypertension; multipractice audit; antihypertension.*

## Introduction

THE effective management of hypertension indisputably reduces the incidence of stroke, myocardial infarction, and cardiovascular death in middle-aged and elderly patients.<sup>1</sup> Essential hypertension is common, with a prevalence of between 5% and 15% of the adult population.<sup>2,3</sup> Further, it is a condition almost entirely managed in a general practice setting. We need to know how well this common condition is managed by general

practitioners (GPs). Various ways of auditing this area have been used in the past. Wilber and Barrow first described the 'rule of halves' in 1972,<sup>4</sup> pointing out how badly hypertension was managed. Only half of the adult population had its blood pressure measured, only half of the hypertensives had their blood pressure treated, and only half of those being treated had their blood pressure controlled. Since then, most audits of hypertension have made some reference to this audit strategy.

However, subtle differences in methodology and definitions can generate discrepancies in results and can confound a comparison of GP performance. For example, a recent study<sup>5</sup> clearly demonstrated that using thresholds from five different guidelines produced startling alterations in assessment of overall control of hypertension. When analysing the same population, control could be assessed at 17.5% when American guidelines were used and 84.6% when Canadian guidelines were used. Whether these differences were due to the weighting of different risk factors in different guidelines, or to the variable effects of numbers of recordings and digit preference, has not been addressed,<sup>6</sup> but it is obvious that such confounding factors should be considered when designing and interpreting such audits.

The design of audits of primary care management of hypertension is fraught with methodological difficulties, which could significantly influence their results. This paper attempts to demonstrate this with reference to published audits in this area, and proposes a 'framework' for audit design, which will help GPs avoid such pitfalls.

## Method

Seven GPs, with experience of work on local Medical Audit Advisory Groups, and the three authors formed a focus group to identify a consensus view on the key areas to be covered by an 'ideal' audit of hypertension management (Table 1). We then reviewed how published audits dealt with these areas.

To identify published audits of hypertension management in United Kingdom (UK) general practice, four electronic databases (MEDLINE, Edina, Bids, and Embase) were searched from 1987 onwards, using the search terms: 'hypertension', 'audit' or 'survey', and 'general practice' or 'primary care'. A manual search of the references of selected articles was undertaken and three recognized authorities in this area were approached to identify further published studies.

The following inclusion criteria defined the scope of our study: the audit must have been performed in a UK general practice setting; examined the practical management of hypertension; examined practice populations selected only by age, sex, or the diagnosis of hypertension; and explored components of the 'rule of halves' approach, such as measurement, treatment, and control of blood pressure. Studies which explored attitudes only were excluded, so were prospective studies, hospital-based studies, and randomized controlled trials. Articles which met these criteria were then scored independently by two of the authors to indicate whether each key area was covered and the extent to which it was covered. The scale used was 0 = no coverage, 1 = some coverage, 2 = complete coverage of key area identified (Table 2).

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**Table 1.** Key areas identified by focus group: with associated justification for inclusion.

Key area	An effective audit of the management of hypertension should do the following:	The justification for including each key area is that:
1	Systematically search the entire patient notes including computer records, correspondence, disease registers, summary cards, and continuation sheets.	No single area of a patients' notes contains all the essential information needed in an audit. <sup>25</sup>
2	Select patients for the audit without bias. extrapolated. <sup>30</sup>	The selection of patients should produce an adequate representative random sample, otherwise results cannot be
3	State clearly the number of blood pressure recordings used to diagnose hypertension and calculate control.	Hypertension can be erroneously diagnosed when a small number of recordings are used. <sup>31</sup>
4	State how patients with a limited number of blood pressure recordings are dealt with.	Varying numbers of recordings will have a significant effect on calculated mean prevalence of hypertension. <sup>30</sup>
5	Examine a clearly stated time period, preferably of five years or less.	Many patients have their treatment altered with the passage of time for a variety of reasons, and so an audit which covers a period greater than five years would be difficult to interpret. Also the definition of hypertension and control changes with the passage of time. <sup>20</sup>
6	Specify how patients with hypertension are identified within the audit.	The category 'hypertension' could be based on labelling, treatment, or BP records, and the method used by the audit could significantly alter the results.
7	Take into consideration the age of the patient when defining hypertension and control.	Patient age can alter the definition of hypertension and control <sup>31</sup> and can influence the prescribing habits of GPs. <sup>32</sup>
8	Distinguish between patients receiving drugs for the indication of hypertension from those receiving the same drugs for other reasons.	Some patients receive antihypertensive drugs for indications other than hypertension.
9	There should be a clear definition of controlled hypertension.	Different thresholds used to define control can have profound effects on the results of an audit. <sup>5</sup>
10	In multipractice audits, inter/intra-practice variations should be considered.	Clustering of patients in a practice and different numbers of patients in a sample may skew results. <sup>13,33</sup>
11	The extent of digit preference should be commented upon.	Digit preference can affect the diagnosis of hypertension based on a few recordings. <sup>17,18</sup>
12	An assessment of management of other risk factors for cardiovascular disease should be performed.	Assessment of other risk factors can give a better idea of a patient's absolute risk for a cardiovascular event. <sup>5</sup>
13	There should be clearly stated objectives with recognized standards against which performance should be assessed. If a particular set of hypertension guidelines is used (e.g. the British Hypertension Society (BHS) guidelines) this should be so stated.	Many sets of hypertension guidelines exist <sup>26,27,31,34,35</sup> with different messages, and the results of any audit is considerably affected according to which set are used. <sup>5</sup> To facilitate interpretation of any audit the authors should specify which set have been used.

Any disagreements on scoring were resolved by subsequent discussion.

## Results

The focus group identified 13 key areas that an 'ideal' audit of hypertension would be expected to cover (Table 1).

Each of the database searches identified a range of articles; only seven were identified that met the inclusion and exclusion criteria.<sup>5,7-12</sup> A further four articles were found by checking references and by speaking to recognized authorities.<sup>13-16</sup> Different approaches to auditing the management of hypertension were identified. One was a case control study, which compared index cases of first-ever stroke with two controls matched for age and sex in 93 practices.<sup>16</sup> Half of the remaining 10 articles were audits performed in single practices and half were multipractice audits (range: 3 to 27 practices). The number of patient records audited varied between 23 and 347 for the single practice audits. The mean sample size per practice in the multipractice audits varied from 38 to 128 patients. The study which examined the most patient records (2428) involved 27 practices.<sup>7</sup>

The score obtained by the selected audits for each of the key

areas is summarized in Table 2. The maximum possible aggregate score was 26. The range of aggregate scores for each audit was from 8 to 17 (30–65% of maximum possible score). The detailed coverage by the published audits of each of the 13 key areas identified by the focus group is shown in Table 3.

## Discussion

Using a focus group, we devised a 'framework' to help GPs design both inter-practice and 'in-house' audits of the management of hypertension. Our focus group was highly selected but consisted entirely of GPs with an interest in this area. Each key recommendation made in Table 1 was accompanied by its justification with reference to the relevant literature. We accept that the criteria developed by the focus group was not definitive and that there are many other areas which could be included in an audit of hypertension management. However, we have focused our paper on auditing the control of hypertension with special reference to the 'rule of halves' approach in a general practice setting. We have made no attempt to rank the various criteria, although this would be a suitable subject for future work. It is clear that different published audits have placed different emphases on each of

**Table 2.** Coverage of each of the key areas by identified audits and associated 'score' obtained.

	Haigh <sup>11</sup> 1989	Mant et al <sup>10</sup> 1989	Chapman & Ridout <sup>12</sup> 1989	Evans & Steel <sup>14</sup> 1991	Tudor-Hart et al <sup>9</sup> 1991	Meagher et al <sup>8</sup> 1993	Fahey & Lancaster <sup>7</sup> 1995	Fahey & Peters <sup>5</sup> 1996	Aylett et al <sup>15</sup> 1996	Fahey & Peters <sup>13</sup> 1996	Du et al <sup>16</sup> 1997
Key area											
1	1	1	1	1	2	1	2	1	1	1	1
2	0	2	2	2	1	1	2	2	1	2	1
3	1	2	0	0	2	1	2	2	2	2	1
4	0	1	0	0	0	0	1	0	0	1	1
5	1	2	2	2	2	2	1	0	0	0	2
6	1	2	0	2	1	1	2	2	2	2	1
7	2	0	0	0	0	0	2	2	1	0	0
8	0	0	0	0	0	0	0	0	2	0	0
9	0	1	1	1	0	1	2	2	1	2	1
10	0	0	0	0	0	0	0	2	0	2	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	1	1	1	1	1	0	2	1	2	1
13	2	1	1	2	2	2	2	2	2	2	1
Total score	8	13	8	11	11	10	16	17	13	16	10

**Table 3.** Coverage of the key areas in each of the selected audits.

Key area
1 Four of the audits extracted data from complete patient records, <sup>7,10,12,16</sup> the other seven examined only computer records. <sup>5,8,9,11,13-15</sup>
2 Only one audit selected patients without bias, examining a random sample of records of both hypertensive and non-hypertensive patients; <sup>7</sup> all remaining studies reviewed the records of known hypertensives only. There were distinctly different approaches to the selection of patient records: some conducted a census, <sup>8-12,14</sup> others a random sample. <sup>5,13,15</sup> The method of sampling also varied; two sampled 10% of notes until 50 records were collected from each practice; <sup>5,13</sup> another study randomly sampled 10 records from the personal list of each participating GP. <sup>15</sup> Both of these techniques introduced a bias due to the variation in list sizes.
3 All but two <sup>11,14</sup> audits stated how many recordings were used to diagnose hypertension and calculate control, but different numbers of recordings were used. Some used the last recording, even if this was recorded more than one year previously, <sup>8</sup> others a mean of the last one, two, or three recordings. <sup>5,7,12,13,15,16</sup>
4 Although several audits mentioned the number of recordings taken from the notes, none explained how they handled notes with an inadequate number of available recordings, nor did they comment upon how this may have affected assessment of control.
5 Four audits were not specific about the time period audited. <sup>5,11,13,15</sup> The others examined different time periods of three years, <sup>10</sup> five years, <sup>8,9,12,14,16</sup> and 10 years. <sup>7</sup>
6 One audit did not specify how hypertensives <sup>12</sup> were identified. Some simply audited notes of patients included in a hypertensive register. <sup>8,9,10,11</sup> Others specified notes which contained a 'label' of hypertension with a current authorization for antihypertensive medication. <sup>5,7,13,14,15</sup> One study considered separately the definition of hypertension according to blood pressure recordings available in the patients' notes. <sup>7</sup>
7 Three studies modified the definition of hypertension and control they used according to age. <sup>5,7,11</sup> Seven studies took no account of patients' age. <sup>8-10,12-14,16</sup> Two studies were of elderly patients only. <sup>7,11</sup>
8 Only one of the audits specifically recognized that patients could be receiving antihypertensive drugs for reasons other than hypertension, <sup>15</sup> but the way such patients were handled is not clear.
9 All audits, except one, <sup>9</sup> included a clear definition of controlled hypertension. This latter audit <sup>9</sup> simply reported population mean blood pressures, pre- and post-treatment. Different proportions of patients achieving control were reported, ranging from 17.5% to 84.6% of treated hypertensives, depending on the criteria used to assess control. The blood pressure thresholds used to define control in specified patients varied between audits — sometimes in an attempt to adjust for other risk factors, but sometimes because the threshold used was referred to different guidelines.
10 Two of the multipractice audits <sup>5,13</sup> considered how the apparent management of hypertension in a population is altered because patients are grouped into practices (and patients within a practice are managed in a similar way, but in a different way from patients in some other practices). No significant bias was detected, but this conclusion may not generalize to other studies.
11 None of the audits examined the effects of digit preference or the influence of the variable number of blood pressure records per patient which were used to estimate control.
12 Only two of the 11 papers, <sup>5,7</sup> both from the same author, held that the level of recording of the other risk factors was sufficient to enable estimation of the absolute cardiovascular risk; these papers were based on results derived from computerized practices.
13 All of the published audits stated clear objectives and most specified the source they used to set standards.

the key areas we have identified, which is both understandable and acceptable. Future audits should specify which key areas are being explored; the quality of the results would then be enhanced by taking into account the difficulties and biases we have identified for each key area.

Several of the key areas identified by the focus group were poorly handled by the selected audits; for example, the number of blood pressure recordings used for diagnosis and control, the approach to the problem of digit preference, and the method used to identify hypertensive patients within audits. Most of the key areas listed in Table 1 have been discussed in previous literature, but the method of identifying hypertensive patients needs further discussion now. The method used can directly influence assessment of prevalence and control, different methods causing different inaccuracies. One method relies on a 'label' of hypertension within the notes, but some patients may have had their antihypertensive drugs successfully withdrawn yet remained on a hypertension register; perhaps even more hypertensive patients have no formal label within the notes. Another method is to use the current or previous prescribing of an antihypertensive drug, but a patient may be receiving 'antihypertensive' drugs for reasons other than hypertension, e.g. beta-blockers for anxiety. Also, it is clear that hypertensives predominantly defined by the use of antihypertensive drugs, would inevitably have a high proportion currently on treatment.

A third method of identifying hypertensives is based on the interpretation of blood pressure records. Difficulties here concern the choice of an appropriate threshold to identify hypertensives,<sup>5</sup> the existence of digit preference,<sup>17,18</sup> and the number of available recordings. A low number of readings can lead to an over-diagnosis of hypertension. Therefore, guidelines recommend several readings before diagnosing hypertension or assessing control. However, the number of recordings available for audit in any set of notes varies and many GPs do not record all of their readings.<sup>19</sup> Existing audits have approached this problem by either using only single recordings, or by averaging as many recordings as are available, up to a maximum of, for instance, three. Furthermore, blood pressure control can only be defined using those records made since the last change of antihypertensive medication, which seriously limits the number of eligible recordings as patients frequently have their medication changed.<sup>20</sup> Also, one cannot comment upon current control if the last recorded blood pressure was several years ago.

Whichever method is used, careful statistical analysis is needed when interpreting results to prevent the different errors inherent in each of these methods. We suggest that the minimum requirement for future audits would be to state explicitly which methods have been used and, if possible, to explore how the results depend on the particular choice of methods. We also recommend that authors should report the number of recordings used to calculate control, the percentage of notes which contained that optimum number within the specified time period of the audit, as well as commenting upon the extent of digit preference.

In addition to the problems of low numbers of available recordings, digit preference, and the threshold chosen to define control, we also need to consider if control should be defined by reference to the absolute cardiovascular risk, based on a number of risk factors, rather than hypertension alone. The focus group recommended incorporating an assessment of the management of other risk factors. Although GPs consider these other risk factors to be clinically important,<sup>21</sup> they are currently very difficult to audit<sup>22,23,24</sup> even in computerized practices the general level of risk factor recording is low. This raises doubts about the reliability of estimating absolute risk.<sup>25</sup> In the elderly, there is little evi-

dence that modifying certain other risk factors is beneficial, and mild hypertension and age alone often produce an absolute cardiovascular risk which merits treatment irrespective of other risk factors.<sup>26,27,28</sup> Multiple risk factor assessment may be more widely recorded in the future, but for the time being, an audit of blood pressure control alone using patient records remains a valuable and more feasible method for assessing cardiovascular risk.<sup>29</sup>

We hope our recommendations will help GPs avoid the pitfalls evident in previously published audits in this area. They should not only enhance in-house audits but, for workers who plan to publish the results of their audit, for larger multipractice audits which are designed to inform health authority planning, or for audits designed to reveal trends, our recommendations are a step towards securing valid and reliable information.

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