Better by half: hypertension in the elderly and the ‘rule of halves’: a primary care audit of the clinical computer record as a springboard to improving care

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Background. Despite recent studies highlighting the benefits of treating elderly hypertensives, researchers have shown that the taking on board of these findings has been disappointing in primary care, where the ‘rule of halves’ still applies. Clinical computers could help performance in this area, yet national and local research suggests that they are under-used.

Objective. Our aim is to develop a pragmatic intervention which aims to: improve patient care by translating research findings into practice, increase meaningful computer use, establish ‘paperless’ annual audits and improve ‘networking’ between practices.

Method. Following a baseline audit to ascertain accuracy, the computer records of participating practices were tested against the ‘rule of halves’ for hypertension. Results were presented to each practice (individual practice and aggregate data for all practices). Management guidelines, standardization of computer recording, achievable targets and review dates were agreed. The study was conducted in West London practices using the EMIS computer system in 1996/1997.

Results. An 81% (22/27) practice response rate was achieved. Baseline audit was completed for 22 practices. Fifteen practices appear to be using their computer regularly (two-thirds). Using strict definitions, ‘the rule of halves’ still applies. Using looser definitions, three-quarters of hypertensives are known, two-thirds are treated and just under two-thirds are controlled. This project identified wide inter- and intra-practice variation in: use of the computer, patient follow-up, attainment of target BP, rounding BP readings to target levels and prescribing patterns.

Conclusion. This focused training intervention has introduced practices to evidence-based proactive care and highlighted an important application for clinical computers. A local network of practices has been established for future projects. For elderly patients registered with a GP, the rule of halves has been improved upon, provided that a figure of 160/90 is taken as an adequate control. Attainment of target BP in treated hypertensives was similar to that reported from large trials. There is enormous scope for improving identification and follow-up of hypertensives using clinical computers and systematic models of care. The wide inter-practice variation in hypertension management requires further study.

Keywords. Family practice, hypertension, medical audit, medical records systems—computerized, primary health care.

Introduction

Hypertension and its complications are a major cause of morbidity and mortality in the elderly. There is ‘strong, consistent and convincing’ evidence from major trials of the effectiveness of treatment\(^1\) and evidence that these research findings have not been incorporated into practice in primary care.\(^2,3\) The ‘rule of halves’ for
hypertension states that: ‘half the people with high blood pressure are not known (‘rule 1’), half of those known are not treated (‘rule 2’) and half of those treated are not controlled (‘rule 3’).’ Throughout the rest of this paper we refer to these statements as rules 1, 2 and 3, respectively. If this rule holds truth, then only one in eight of the hypertensive population are receiving optimal treatment. Coined in America in the 1970s, the rule still applied in Scotland in 1986 and in England in the 1990s. A recent primary care audit found that only 31% of treated hypertensives had an average blood pressure (BP) < 160/90 mmHg. Historically, research into the rule has relied on cross-sectional data from epidemiological surveys. Data generated in the course of primary care have the advantage of being longitudinal and more relevant, but have not been previously used.

The aim of this project was to explore the use of computerized clinical records in the management of hypertension in the elderly (aged 65–79 years) in West London practices. The following key objectives were identified, to:

- test the rule of halves;
- analyse prescribing patterns;
- measure levels of rounding blood pressure readings to threshold values;
- compare the pros and cons of auditing the computer versus the written clinical record; and
- ascertain the quality of data held on the computer.

Longer-term aims of the project are to: improve patient care by the effective implementation of locally refined evidence-based guidelines, increase meaningful computer use, establish ‘paperless’ annual audits and improve ‘networking’ between practices.

Method

All practices using the EMIS clinical computer system (for more than 1 year) in Kensington Chelsea and Westminster Health Authority (KCWHA) were invited to participate.

Unless otherwise stated, all findings relate to computer-recorded data only.

In order to test the three rules, we assumed an expected prevalence of hypertension in the elderly of 40%. If rule 1 applied, a rate of 20% would be noted (i.e. half of that expected). We collected two sets of data to test this rule. The first consisted of all patients coded with the label hypertension (coded hypertensives). For the second, this definition was extended to include any patient either with a BP of greater than 160/90 mmHg recorded on the computer in the last 3 years or coded as hypertensive; this group were referred to as identified hypertensives.

In order to test rule 2, the proportions of coded and identified hypertensives who had had at least one BP recording taken in the past year and past 6 months were calculated. We used this as an indicator of follow-up.

In order to test rule 3, mean systolic and diastolic readings covering a 1-year period were calculated for coded hypertensives on treatment, and these readings were then analysed by practice to ascertain the proportion of patients with mean systolic, diastolic and overall BP at or below target levels (160, 90 and 160/90 mmHg, respectively).

Practices were excluded from this analysis if:

- less than 10% of the elderly population were coded hypertensive (i.e. a very unreliable hypertension register); or
- more than 10% were coded but less than 20% of these had been followed up on the computer in the last year.

Analysis of prescribing patterns and frequency of BP recording (i.e. follow-up) for elderly hypertensives was performed only on coded hypertensives. Prescribing levels for the five main categories of antihypertensives were measured (ACE 1 inhibitors, alpha-blockers, beta-blockers, calcium-channel blockers and thiazides).

A simple inter- and intra-practice comparison was made of the tendency for clinicians to round BP readings to critical target values (for systolic to 160 mmHg and for diastolic to 90 mmHg). This was included following an incidental observation of this practice during the study. For systolic pressures, the proportion of all readings of 160 mmHg or greater recorded at exactly 160 mmHg was calculated. The same exercise was performed for diastolic readings (90 mmHg).

In one pilot practice (RH), the quality of BP data capture on the computer for the elderly was compared with a random sample of one hundred written clinical records in order to assess the validity of the computer record.

The quality of data held by practices is reflected in the level of BP recording and coding for hypertension. The exclusion criteria described above defined a minimum level of quality.

Results

Table 1 highlights the relevant profiles of participating practices. These practices vary widely in their organizational structure and approach to health care delivery, reflecting the diversity of inner-city primary care. Twenty-two of the 27 practices approached agreed to participate. It is not clear why practices declined. There were no obvious differences in the practice profiles of participants and non-participants except that none of the latter group were approved training practices.

Figure 1 demonstrates inter-practice variation in prevalence of identified hypertensives (29.5% for all practices, range 11.7–38.7%). Using this loose definition
for hypertension, rule 1 has been improved upon, as three-quarters of expected hypertensives were detected. However, rule 1 still applied when using the coded definition to ascertain prevalence (17.7% for all practices, range 1.8–25.8%).

Rule 2 did not apply if evidence of at least one BP recorded on the computer in the last year in identified hypertensives was taken as a surrogate measure for evidence of treatment (Figure 2). Two-thirds (67%) of identified hypertensives had been monitored within the last year and one half (48%) within the last 6 months. Results were similar for coded hypertensives. For rules 1 and 2, there was wide inter-practice variation in performance.

Unless otherwise stated, the remainder of the results analysis refers to the 14 practices which met the inclusion criteria for rule three. The proportions of coded hypertensives with controlled BP (annual average of 160/90 mmHg or less) are shown in Figure 3. Well over half (61%) of elderly hypertensives had a mean BP within target (70% systolic and 75% diastolic).

Use of the five main classes of antihypertensives is shown in Table 2. Calcium-channel blockers (34%) were the most commonly prescribed BP-lowering drugs. With the exception of alpha-blockers, which were prescribed infrequently, prescription levels were similar for the remaining four classes of anti-hypertensives. The enormous
inter-practice variation in the use of different classes of drug is best highlighted in the greater than five-fold variation in the use of thiazides (Figure 4).

According to the computer records, 75% of coded hypertensives monitored in the last year were seen at least twice (Figure 5). There was wide variation in the frequency of BP monitoring on the computer. Only one practice had a mode annual frequency of BP recording of greater than two and only this practice recorded the BP on four or more occasions in over half of hypertensives (in accordance with many guidelines that recommend 3-monthly follow-up of controlled hypertensives).

On average, practices achieved this level of follow-up in only one-third of patients.

All 22 practices made some effort to code hypertensives on the computer. In two single-handed, recently computerized practices, the levels of coding were very low. Most practices with a high prevalence of coded hypertensives used the computer more reliably for BP monitoring. However, the practice with the highest prevalence of coded hypertensives (25.8%) had only used the computer to record the BP of 31% of this group during the past 6 months. Two further practices with high levels of coding made little use of this data. One of these practices had recorded the BP of only one of 274 coded hypertensives on the computer in the previous 6 months. The GPs made little use of the computer in these three practices.

Practices were sent a brief audit report of their performance and invited to a presentation of the study findings. Five practices attended the presentation and one further practice gave written feedback about the report.

Figure 6 shows significant inter-practice variation in the practice of rounding BP readings to the key threshold diastolic value of 90 mmHg diastolic (a form

<table>
<thead>
<tr>
<th>Drug</th>
<th>Mean (%)</th>
<th>Median (%)</th>
<th>Range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiazides</td>
<td>27</td>
<td>31</td>
<td>8–42.1</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>33</td>
<td>31</td>
<td>19.4–44.0</td>
</tr>
<tr>
<td>ACE 1 inhibitors</td>
<td>24</td>
<td>25</td>
<td>12.5–56.0</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>34</td>
<td>34</td>
<td>25.5–53.6</td>
</tr>
<tr>
<td>Alpha-blockers</td>
<td>5</td>
<td>4</td>
<td>0.0–16.7</td>
</tr>
</tbody>
</table>

For all figures, aggregate data for all practices are shown as ‘*’. Each practice has been ascribed a letter which serves as a unique identifier and is consistent in all figures. Numbers below these letters represent numbers of patients in the target group for that aspect of the study (Figs. 1–5). For Figure 6, this number represents the number of diastolic BP readings used in the analysis.
of terminal digit preference). Similar variation is seen with systolic readings (around 160 mmHg).

Comparison of the accuracy of recording blood pressure and diagnosis of hypertension in the computer records with one hundred manual records in the practice of one of the authors (RH) revealed equal levels of accuracy in the written and computer record (with approximately 70% of hypertensives traced from the written record coded hypertensive on the computer and vice versa). Baseline computer audits took 30 minutes/practice and repeat audits will take 10 minutes. Equivalent manual audits have been shown to take 36.5 hours/500 patient records.8

Discussion

A number of important conclusions can be drawn from this study:

- Approximately three-quarters of participating practices had computer records with sufficient data to test rules 1 and 2, and 59% held sufficient records for more detailed analysis.
- The rule of halves for hypertension had been improved upon (according to the data held on the computer in qualifying practices). Approximately three-quarters of elderly hypertensives had been identified, three-quarters of these had been followed-up within the last year and 60% of ‘coded’ hypertensives had an average BP at or below the target level of 160/90 mmHg. This translates to one in three hypertensives being adequately treated, which is encouraging when compared with previous cross-sectional surveys,4–7 which have suggested that only one in eight is controlled. If the target level were reduced to 159/89 mmHg, the proportion adequately treated would be significantly lower owing to the common practice of ‘rounding down’ BP readings.
- There was wide inter-practice variation in many quality measures of hypertension management, including: (i) patterns of anti-hypertensive prescribing; (ii) frequency of follow-up; and (iii) levels of terminal digit preference.

Over the past 5 years, one of the authors (RH) has gained considerable knowledge of family practice in the locality of this study. He has conducted a number of surveys involving all of the practices within the Health Authority (approximately 100) and worked as a Local Medical Committee representative. In the light of this experience, we believe that the practices participating in this study do reflect the variety of inner-city general practices that have become computerized in recent years. Of its generation, the EMIS system was one of the most favourably received, and one might therefore argue that its users were more likely to be forward thinking.

The improved management of hypertensive populations has also been observed by Aylett,12 and may reflect changes in screening and surveillance following the 1990 contract.13

An interesting trend (which did not reach significance) can be seen in Figures 1, 2 and 6, with practices that performed well in identification and follow-up of hypertensives having lower levels of ‘rounding down’ BP levels (Figure 6).

The wide inter-practice variation in frequency of follow-up, attainment of target BP, rounding off of BP values and use of anti-hypertensive drugs raises important quality issues. A practice with a large proportion of hypertensives attaining target BP may be effectively controlling BP (high quality of control) or may round off more BPs (poor quality of data). A practice with a high proportion of elderly hypertensives taking beta-blockers may be unaware of their disappointing impact on improving patient outcomes in major studies (clinical practice lagging behind research evidence) or it may reflect an effective programme of secondary prevention of CHD. Particularly striking were the five-fold variations in the use of thiazides and the tendency to round diastolic BP to 90 mmHg. Highly significant variations of such magnitude warrant further investigation.

This study highlights the potential for clinical computer systems to assist a network of practices in proactive population management and in the measurement of the quality of clinical care. We found that the assessment of many practices by computerized audit took less time than a more rudimentary manual audit in a single practice. Primary care computing is still in its infancy, which was reflected in the finding that a substantial proportion of practices were making no effective use of their computers for the relatively simple task of hypertension monitoring. There is considerable scope for improved use of the computer in the remaining practices. The lack of systematic recording of data by these grass roots practices presents a problem in terms of data analysis and interpretation.

The low response rate of participants to the individual practice reports and invitations to presentations of the study findings suggest that most teams do not consider systematic patient care to be a priority. General practice is in a perpetual state of flux, and intervention studies aiming to change behaviour may be perceived as a threat in such a setting. It is for this reason that the next phase of this project has been delayed in order to allow wider consultation. The aim is to improve management of hypertension in the elderly by developing and implementing evidence-based local guidelines. Drawing upon the work of, amongst others, Grimshaw9 and Feder,11 we will develop a multifaceted training intervention that will
use social influence, personal feedback and the transfer of knowledge and skills to modify clinical behaviour. Practices will be introduced to proactive chronic disease management and will be encouraged to extend the role of the practice nurse in this field. The use of the computer for hypertension management will be standardized.

Despite evidence of some improvement in the management of hypertensive populations, there is enormous scope for the implementation of more systematic models of care. In these practices, heavy investment in computerization has not translated into effective use of this technology for population management, where it has such potential. The long-established principles for improved chronic disease management of systematic case finding and follow-up, together with modern views on drug therapy and target BP, are all more than adequately documented in the literature. Greater emphasis should be placed on training (proactive population management in primary care and pragmatic training in the use of computers). The health agencies are ideally placed to co-ordinate educational programmes.

Further studies are needed to explore the wide inter-practice variation in management of hypertensives highlighted by this project.

Sustainable quality monitoring could be achieved by the development of a simple, validated, computer-based audit tool to assess the effectiveness of individual practices in delivering systematic hypertension management.

Finally, ‘academic detailing’ by the district pharmacist would improve practice prescribing patterns for elderly hypertensives.

References